

THE
IMMEDIAL COLOURS
AND THEIR APPLICATION
ON
COTTON.

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Frankfort o. Main.

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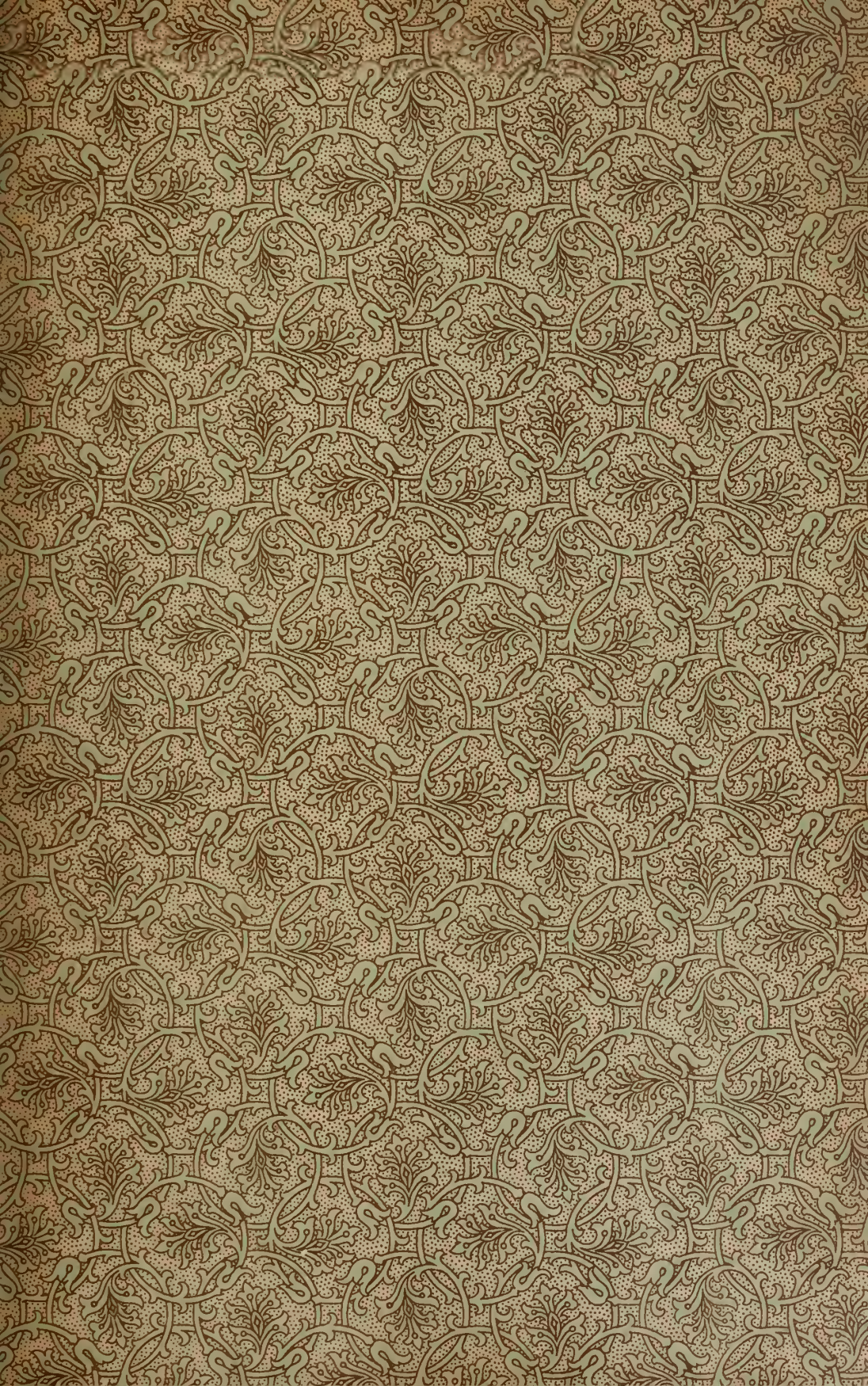
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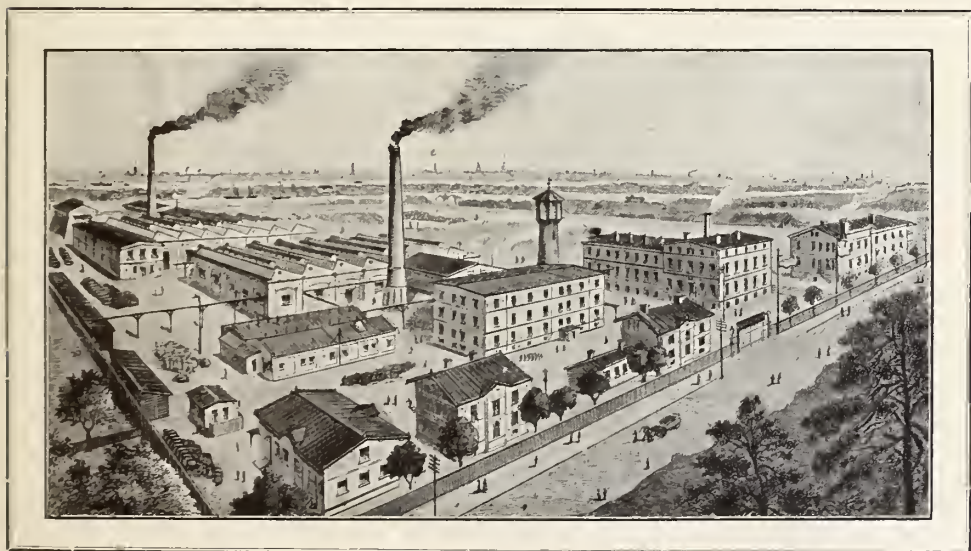




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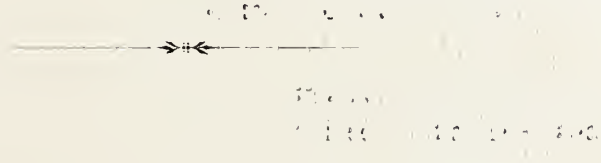
LEOPOLD CASSELLA & Co., FRANKFORT o. M.



Aniline Colour Works at Mainkur near Frankfurt o. M.

OCTOBER 1901.

THE IMMEDIATE COLOURS
AND THEIR APPLICATION
ON
COTTON.



LEOPOLD CASSELLA & C^o.
FRANKFORT O. M.



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The great success our Immedial Colours met with since in 1898 they appeared on the market, and their having been adopted in the various branches of the cotton, linen etc. industries, offered us sufficient opportunity to study their best methods of application on a large scale. These we placed before our friends in a pamphlet in March 1900, dealing with Immedial Blue and Immedial Black, which was so favourably received that we had to issue a new edition within eighteen months.

This we herewith beg to hand you in a somewhat expanded form, containing the various experiences gained in practice, and we thus believe that this little book contains a description as precise as possible of the various methods of applying our Immedial Colours.



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Index.

	page
General	1
Storing the colours	3
Dissolving and dyeing of the Immedial Colours	4
Aftertreatment	7
Aftertreatment of dyeings with chromium salts	7
Aftertreatment with acetate of soda	8
Developing Immedial Blue C by steaming	10
Developing by smothering	12
Aftertreatment of Immedial Brown dyeings with Nitrazol C	13
Modification of the shades	15
Combination of Immedial Blue dyeings with Indigo	16
Combination of Immedial Black with One-Dip Aniline Black	18
The Dyeing of loose Cotton	19
Dyeing of Immedial Black on loose cotton (see also page 102)	21
Aftertreatment	23
Dyeings of Immedial Black on loose cotton; plate I.	
Dyeing of Immedial Blue C on loose cotton (see also page 102)	24
Steaming of loose cotton	25
Dyeings of Immedial Blue C on loose cotton; plate I.	
Dyeing of Immedial Brown B and Immedial Bronze A on loose cotton (see also page 103)	26
Dyeings of Immedial Brown B and Immedial Bronze A on loose cotton; plate II.	
The Dyeing of Cotton Yarns	27
Dyeing of Immedial Black on cotton yarn (see also p p. 104 and 107)	29
Aftertreatment	33
Brightening	34
Dyeings of Immedial Black on cotton yarn; plates III and VI.	
Dyeing of Immedial Black on mercerised cotton yarn (see also pag. 104)	36
Dyeings of Immedial Black on mercerised cotton yarn; plate III.	
Dyeing of Immedial Blue C on cotton yarn see also page 105)	38
Steaming of the dyeings	39

VI

	page
Developing with peroxides of sodium or hydrogen	40
Immedial Blue C as a bottom for Indigo	41
Topping Immedial Blue with basic colours	41
Dyeings of Immedial Blue C on cotton yarn; plates IV and VI.	
Dyeing of Immedial Brown B and Immedial Bronze A on cotton yarn; (see also page 106)	42
Dyeings of Immedial Brown B and Immedial Bronze A on cotton yarn; plates V and VI.	
The Dyeing of loose cotton, sliver, roving, yarns, cheeses and cops in dyeing machines	43
For dyeings see plates III and IV.	
Dyeing of Immedial Black in dyeing machines	45
Aftertreatment	48
Dyeing Immedial Blue C in dyeing machines	49
Dyeing Immedial Brown B and Immedial Bronze A in dyeing machines	53
The dyeing of cotton warps	55
Dyeing of cotton warps with Immedial Black (see also page 108). . .	57
I. Dyeing in the common or small warp dyeing machine . . .	57
II. Dyeing over the winch	58
III. Dyeing in the continuous warp dyeing machine	59
IV. Dyeing in the continuous warp dyeing machine, combined with submersion of the warps	62
V. Dyeing beamed warps in warp dyeing machines	63
VI. Dyeing warps in the sizing machine	64
Fast Black warps dyed with Immedial Black; plate VII.	
Dyeing cotton warps with Immedial Blue C	65
I. In the common small warp dyeing machine	65
II. Over the winch	65
III. In the continuous warp dyeing machine	65
IV. Dyeing beamed warps in the warp dyeing machine . . .	66
Combination of Immedial Blue C with Indigo, on cotton warps	67
The dyeing of piece goods	69
Dyeing of Immedial Black on piece goods (see also page 109) . . .	71
A. Dyeing in the continuous machine	71
B. Dyeing in the jigger	73
C. Dyeing in the jigger with submersion	76
Aftertreatment	77
Dyeings of Immedial Black on cotton piece goods; plate VIII	
Dyeing Immedial Black on mercerised piece goods (see also page 109)	78
A. Dyeing in the continuous machine	78
B. Dyeing in the jigger	79
Dyeings of Immedial Black on mercerised cotton piece goods; plate VIII.	

	page
Dyeing Immedial Blue C on piece goods (see also page 110) . . .	81
A. Dyeing in the continuous machine	81
B. Dyeing in the padding machine	81
C. Dyeing in the jigger	83
D. Dyeing over the winch	84
Developing to Blue: a) by steaming	86
b) by topping with Indigo	88
Dyeings of Immedial Blue C on cotton piece goods; plate IX.	
Dyeing Immedial Brown B and Immedial Bronze A on piece goods (see also page 111)	89
Dyeings of Immedial Brown B and Immedial Black on velvet; plate X.	
Appendix	91
Dyeing Immedial Black on hosiery	93
Grey and mode shades	95
Discharging Immedial Blue C	96
Immedial Black for grey shades in calico printing	98
Immedial Black for yarn printing	100
Dyeing of linen and cotton mixed goods and linens (see also page 110)	101
Dyeings of Immedial Blue C on linen and cotton mixed goods and linens; plate IX.	



Immedial Colours.

The Immedial Colours possess the property of dyeing direct, without any mordant. deep, well covered shades of prominent fastness on cotton, and by reason of these advantages they are extensively employed in all branches of cotton dyeing.

Up to the present the following Immedial Colours are in the market:

Immedial Black V extra	}	Immedial Black V extra serves for
„ „ FF extra		the production of blue black shades.
„ „ G extra		Immedial Black FF extra yields a beautiful rich black with a bluish cast, similar in shade to Aniline Black.

Immedial Black G extra gives a deep black with a greenish cast.

Besides their prominent fastness to washing, milling, and light, these colours are so fast to acids that they may serve to dye warps used for all styles of Unions.

Immedial Black V extra and FF extra are well adapted for dyeing mercerised cotton yarns and piece goods, as the resulting black is of special fulness and the lustre of the cotton remains unimpaired by the dyeing process.

Immedial Black NB } possess equally prominent properties regard-
" " NG } ding fastness as the above named brands.
In fulness of shade and bluish cast they
are not quite equal to the "extra" brands,
but the difference is not material, and NB
especially yields a very beautiful black
nearly equal to the FF extra brands.

In tinctorial strength Immedial Black NB
and NG are equal to the "extra" brands,
whilst their price is a lower one. NB gives
a blue black, NG a greenish black.

Immedial Blue C. This colour is used to a great extent
for loose cotton as well as for yarn and
piece dyeing.

The dyeings resist the severest washing
without losing in depth, and white cotton
washed together with the blue does not
become tinted at all or in a very slight
degree only.

Washing tests against Indigo dyeings of
equal depth have demonstrated that the
latter became reduced to a light blue after
ten domestic washings, whilst Immedial Blue
did not suffer any perceptible alteration.

In fastness to light, Immedial Blue is
equal to the best Indigo dyeings. The blue
may be shaded at will by topping with
basic colours, without any alteration of the
fastness to light of the dyeings.

Immedial Blue dyeings resist a boiling
acid bath (for Union dyeing) and withstand
even the acid chrome liquor commonly
employed for mordanting woollen piece
goods.

Immedial Blue dyeings are also very
fast to rubbing and mangling.

Immedial Blue and Indigo are frequently combined by either topping the Immedial Blue with Indigo or topping the Indigo with Immedial Blue. These combinations are of great importance, because not only is their fastness to washing and light better, but also their cost is about 50 per cent less compared with pure Indigo shades of equal depth.

Immedial Brown B serves frequently for producing colours eminently fast to washing and acids, on loose cotton, yarn, and piece goods (especially moleskin and velvet), and has further proved to be very well suited for dyeing cotton sliver, cops and cheeses in the apparatus.

The aftertreatment with sulphate of copper and bichromate of potash enhances the fastness to light of the dyeings of Immedial Brown to such a degree that it surpasses that of Cutch dyeings, the direct dyeings or those coupled with Nitrazol are however a trifle inferior. The fastness to acids is very prominent and materially better than that of Cutch dyeings.

Immedial Bronze A has properties similar to those of Immedial Brown and is specially suitable for the production of mode shades either by itself or in combination with Immedial Black.

Storing the Colours.

The Immedial Colours should always be stored in a dry place and protected against humidity. Care should also be taken to cover the kegs up well again after each draw of colour.

Dissolving and Dyeing of the Immedial Colours.

Dissolving. The Immedial Colours are best dissolved in wooden vessels, by pouring over them hot water containing a part of the sodium sulphide required in the dyeing process. Vessels, pipes or fittings of brass or copper should be avoided both for dissolving and for dyeing. The metallic parts necessary should be made either of iron or lead.

Dyeing. Vessels constructed either of iron or wood are best suited.

Copper has an injurious effect on the liquor only; the dyed cotton may after rinsing come into contact with any kind of metal without suffering any injury.

The dye bath is charged with soda, sodium sulphide and common salt or Glauber's salt. The quantities required of each for the various colours are given with the separate methods of dyeing.

**Effect of Sodium
Sulphide.**

The sodium sulphide has the very important mission to keep the colour in solution during the dyeing process, and the aspect of the dye liquor is therefore a reliable guide for the correctness of the addition made: a sufficiently large quantity of sodium sulphide keeps the bath absolutely clear, an insufficient addition renders it turbid, and the liquor if dropped on white blotting paper, shows a visible precipitation. In the latter case a further addition of sodium sulphide brings the bath up to the required condition.

It is specially requisite to thus restore the bath, either after its prolonged disuse or after too severe boiling. Unnecessary and excessive boiling should therefore be avoided, because it favours the oxidation of the sulphide too much. On the other hand, an excess of sulphide cannot be recommended, the dyeings thereby remaining thin.

We have put two qualities of sodium sulphide on the market, viz, the "crystallised" and the "concentrated" quality.

Our details contained in these pages refer to crystallised sodium sulphide only. When working with the concentrated product, only half the stated quantities are to be taken.

Soda ash is added in order to preserve the alkalinity of the dye bath and to increase the effect of the sodium sulphide. In some cases soda ash is substituted by caustic soda lye. Effect of Soda ash.

Common salt and Glauber's salt promote the exhausting of the colours, same as is the case with the Diamine Colours. Effect of Salts.

For pale shades the quantities of common salt or Glauber's salt must be moderated, whilst dark shades require an increase of salts.

In order to control the amount of salt contained in the dye baths which are in constant use, frequent gravity tests should be made of them with an areometer. For dyeing blacks, the cold liquor may weigh up to 9° or 12° Tw. but not more than about 4½° Tw. in the case of Immedial Blue. If the liquor be heavier, an addition of salts for succeeding batches may be dispensed with.

Common salt and Glauber's salt may be employed with the same result, 10 parts of common salt being equal to 12 parts desiccated Glauber's salt or 24 parts crystallised Glauber's salt.

For dyeing in the mechanical dyeing machine, crystallised Glauber's salt should preferably be employed.

Various other additions are resorted to only in special cases, as for instance the addition of dextrine or sodium chromite for the dyeing of black on piece goods, or, of Turkey red oil for warp dyeing etc., in order to facilitate penetration. Other Additions to the Dye bath.

The dye bath may be preserved constantly without fear of deterioration. Through the prolonged contact with the air however the sodium sulphide contained in the liquor may become oxidised and the colour thereby precipitated. If however some sulphide of sodium is added and the bath properly heated, it is fit for immediate use again. Preserving the Dye bath.

Temperature of
the Dye baths.

The dyeing with the Immedial Colours is most frequently commenced by boiling up the dye bath charged with all the ingredients, shutting off steam, entering the goods, and dyeing to the finish without further application of heat.

Continuous and violent boiling must be avoided in order to prevent the oxidation of the sodium sulphide.

The dyeing operation may in some special cases be equally well conducted in a lukewarm or even a cold bath, and dyeing at the boil is recommended simply for well known technical reasons and not on account of any special property of the Immedial Colours.

Squeezing off
and Rinsing
after Dyeing.

It is very important that the goods be squeezed as perfectly as possible and rinsed immediately after dyeing. The more thoroughly and evenly the goods are squeezed and rinsed, the faster they will become to rubbing and the more even will be the shade.

The first rinsing liquor which contains a fair amount of dyestuff may be added to the dye bath again or serve for dissolving the next addition of dyestuff. It is not essential that the goods be kept below the surface of the liquor.

In dyeing Immedial Blue C, a slight deviation in the process must be made, in so far as after dyeing the cotton must not be rinsed but only well squeezed or evenly wrung off and steamed in this state.

Aftertreatment.

In order to increase the fastness, to improve the shade, or to increase the stability of the fibre, dyeings of Immedial Colours may be submitted to various methods of after-treatment.

Our patented processes are the following:

the aftertreatment with chromium salts,

the aftertreatment with acetate of soda for dyeings which are subsequently subjected to an acid treatment,

the steaming with the admission of oxygen,

the treatment with the peroxides either of hydrogen or of sodium, also

the development with Nitrazol.

Buyers of our Immedial Colours acquire the right to apply the afore mentioned methods of aftertreatment.

Aftertreatment of Dyeings with Chromium Salts.

The aftertreatment with chromium salts is chiefly resorted to for Immedial Black, whilst for Immedial Brown bichromate of potash and sulphate of copper are to be given the preference.

The aftertreatment of Immedial Black chiefly serves the purpose of varying the shades according to requirement, whilst it improves the fastness to light in the case of Immedial Brown.

For **Immedial Black** the following methods of aftertreatment have proved to be the best suitable:

for blue black shades: 3 0/0 bichromate of potash
3 0/0 acetic acid

for jet black shades: 1 1/2 0/0 chrome alum
1 1/2 0/0 bichromate of potash
3 0/0 acetic acid.

Immedial Brown is to be aftertreated as follows:

1 0/0 sulphate of copper
2 0/0 bichromate of potash
3 0/0 acetic acid.

The aftertreatment should in all cases be followed by a thorough rinsing.

Aftertreatment with Acetate of Soda.

Whenever the dyed goods are not finally submitted to an alkaline finish, such as soaping, oiling etc., the last rinsing water should contain an addition of about 4 oz. acetate of soda and the goods be therein treated for a few minutes, after which treatment they should be dried without any further washing.

This rinsing with acetate of soda has the object of increasing the resistance of the fibre.

If the yarns or goods are submitted to some finishing process, the acetate of soda may be added to the finish.

If the dyeings are brightened with acetic acid for the purpose of producing a silky scroop, a treatment

which black yarns are frequently subjected to, the acetate of soda may be added to the scrooping bath.

The cotton yarns are then soaped as usual and hereafter passed through a bath containing, instead of acetic acid alone:

1 pint acetic acid and

$\frac{1}{2}$ to 1 lb acetate of soda

per 10 gallons liquor.

Developing Immedial Blue C by Steaming.

This operation may easily be carried out in any chest made of either wood, copper or iron, or just as well in an ordinary dye vessel.

It should be observed in any case that the cotton must not be rinsed after dyeing but simply well hydroextracted or otherwise freed from an excess of liquor, before being subjected to the steaming process.

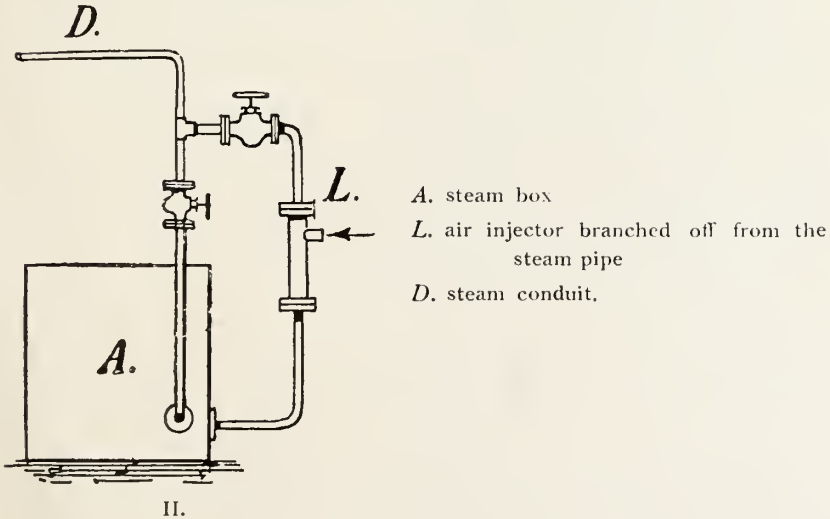
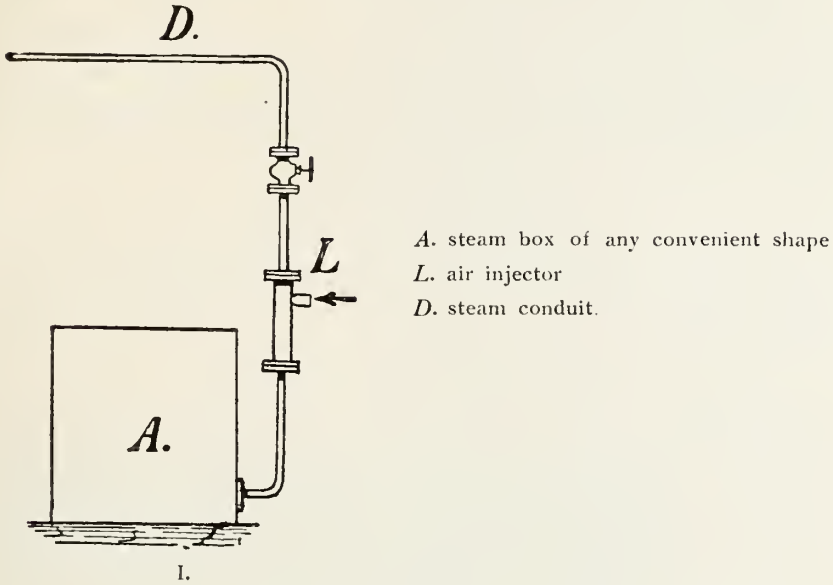
To effect an even distribution of the steam in the goods, it is advisable to suspend yarns and pieces on laths in the steam box, whilst loose cotton or warps should only be piled up in layers of reasonable height. The steam chest remains closed during the steaming operation. If the steam box be constructed of wood, the lid should be covered with felt or woollen cloth in order to render it as tight as possible.

The steam is best introduced at the lower part of the chest in order to allow the condensed water to run off freely, and altogether care must be taken to prevent any condensed liquid from spotting the goods.

Very wet steam may however be rendered more serviceable by placing along the bottom of the chest a steam heating pipe for heating the box previous to charging it with the goods.

The hotter and the drier the steam, the more rapid is the developing and the brighter the shade of the blue.

Air is also admitted into the steam box simultaneously with the steam. This is done by means of a small injector*) which is adjusted between the steam pipes by means of two flanges as shown in the sketch below.



*) For the convenience of our customers we hold a supply of these air- and steam-injectors which we are pleased to furnish at 15/— a piece.

The first sketch illustrates the steaming arrangement of a box used for steaming only. For vessels intended to serve also for dyeing, without disturbing the existing arrangement of the steam pipes, a short branch pipe may be introduced as shown in the second sketch on the preceding page.

This arrangement allows of the alternate admission, according to requirement, of either steam alone or steam and air.

After steaming, the goods are rinsed in hot water and then dried or previously greased if required.

Developing by Smothering.

Similar to developing by steam is the developing of Im-medial Blue by smothering the dyed, moist cotton (loose cotton, yarn and piece).

The method of working is as follows:

The dyed and hydroextracted or squeezed cotton is placed whilst still as warm as possible in skeps or wooden boxes, the inside of which is lined either with oiled brown paper or oil cloth (American cloth); these receptacles are then covered up to prevent a cooling or drying of the contents, and placed for a few hours, or overnight, into the drying room.

The developing of the blue in this way is best carried out by keeping the temperature of the drying room at 140—160° F.

Piece goods and warps may be placed for smothering in the ordinary dyers' barrow, but care must be taken to place them in such a way that they do not dry against the sides and that they retain their heat for a few hours.

After lifting the goods are rinsed in hot water.

The Aftertreatment of Immedial Brown Dyeings with Nitrazol.

This aftertreatment, the so called "coupling", causes the colours to become considerably yellower and more intense.

The coupling is carried out by treating the dyed and washed cotton for $\frac{1}{2}$ hour in the cold coupling bath, which should be charged as follows:

NOTE.

On account of the liability of **Nitrazol C**, pat., to spontaneous combustion, we do not carry this article in stock, but submit this card for the valuable information and instructions contained therein for the diazotizing of **Paranitraniline C**, and the use of this diazotized product for the coupling of our colors.

Dyeings done with 3—5 % colour:	Dyeings done with 6—12 % colour:
2 lbs Nitrazol C. pat. $\frac{1}{2}$ lb soda ash $3\frac{1}{4}$ oz. acetate of soda	3—4 lbs Nitrazol C. pat. $\frac{3}{4}$ —1 " soda ash $3\frac{1}{4}$ —4 oz. acetate of soda.

The dissolving of Nitrazol C is best done by pouring over it a moderate quantity of cold water (no warmer than 65—80° F.), crushing the lumps, and bringing complete solution about by adding a sufficient quantity of cold water.

The coupling bath is charged by adding first the solution of Nitrazol, then the soda, and finally the acetate of soda.

The cotton is treated in a cold bath for $\frac{1}{2}$ hour and afterwards rinsed in the usual manner.

Modification of the Shades.

Apart from the fact that the various Immedial Colours may be mixed at will with one another, the simplest way of shading off is the topping of the dyeings with basic colours.

**Topping with
Basic Colours.**

The Immedial Colours possess to a still greater degree than the Diamine Colours the property of fixing basic colours. The fastness of the dyeings is not impaired by this process, provided it is not resorted to more than necessary for the purpose of brightening the colours.

The topping is carried out by washing the goods well after dyeing and entering them into a fresh bath containing the solution of basic dyestuffs.

It is done at ordinary temperature and with addition of 2—4 % acetic acid calculated on the weight of the cotton. Colours which exhaust very rapidly should be added in solution in two or three portions.

If sufficiently soft water be at hand, the topping may also be done in a soap liquor.

On account of their being also well suited for dyeing in a bath containing sodium sulphide, some of the Diamine Colours, viz. Diamine Fast Yellow B and Diamine Orange B, may be added straight to the dye bath for shading purposes.

**Shading off
with Diamine
Colours**

Combination of Immedial Blue Dyeings with Indigo.

It has already been mentioned on page 3 that Immedial Blue C has proved an excellent bottom for Indigo dyeings.

The combination is effected by first dyeing Immedial Blue C according to given instructions and subsequently topping in the Indigo vat.

This method does not necessitate steaming of the Immedial Blue dyeings except in special cases, this depending in the first place on the shade required and the kind of vat employed.

If the topping be done in the hydrosulphite vat, a previous steaming may be dispensed with, both for dark and pale shades.

With the use of zinc dust and lime vats, pale shades become brighter if previously steamed, whilst for medium and dark shades steaming may be dispensed with.

With copperas and lime vats, a previous steaming should be recommended, the resulting shades becoming thereby brighter.

It is immaterial whether the goods grounded with Immedial Blue are rinsed or not before being topped in the vat: after topping in the vat it is however advisable to leave the goods for 2 or 3 hours before souring off and rinsing or washing.

The topping of piece goods is frequently modified by leaving them, after the grounding with Immedial Blue C, for 12 to 24 hours without washing, well covered up with felting, and topping them subsequently in the vat.

Occasionally yarns may also be first dyed in the Indigo vat and be subsequently topped with Immedial Blue C, in which case the dyeing and steaming is the same as described for Immedial Blue.

Immedial Blue may with advantage be added to the hydrosulphite Indigo vat, provided the reducing agent is pure hydrosulphite free from zinc compounds.

Combination of Immedial Black with One-Dip Aniline Black.

It is sometimes necessary to combine Immedial Black with one-dip Aniline Black in order to increase the weight of the dyed yarn to the same extent as it would gain if dyed according to the one-dip Aniline Black process.

For this purpose, a light shade of Immedial Black is dyed, and topped with one-dip Aniline Black.

The following is a formula for a one-dip Aniline Black.

For 100 lbs cotton yarn prepare a bath with:

4 " Aniline Salt
6—7 " hydrochloric acid 30° Tw. (diluted with water),
to which add

3 lbs sulphate of copper }
4 " bichromate of soda } dissolved in water.

Work the yarn 45 minutes in the cold bath, raise the temperature slowly within $\frac{1}{2}$ hour to 120--140° F, lift, wash, and soap (about 2 lbs soap per 100 gallons).

Loose cotton requires 5 lbs Aniline Salt for each 100 lbs; the rest of the ingredients remain the same as for yarn.

The Dyeing of Loose Cotton.

Dyeing of Immedial Black on Loose Cotton.

In wooden or iron vessels.

(Vessels or steam coils of copper must be avoided.)

For 50 lbs loose cotton

in about 80 gallons of dye liquor, charge the

Starting bath:

for Immedial Black V, FF and G extra with:	for Immedial Black NB and NG with:
4 lbs soda ash	4 lbs soda ash
4— 5 " sodium sulphide	6— 7 " sodium sulphide
8—10 " Immedial Black V, FF or G extra	8—10 " Immedial Black NB or NG
30 " common salt*)	30 " common salt*).

For dyeing subsequent lots in the old bath, the following approximate quantities, calculated on the weight of the cotton, are added:

2 0/0 soda ash	2 0/0 soda ash
4— 5 0/0 sodium sulphide	6— 7 0/0 sodium sulphide
9—12 0/0 Immedial Black V, FF or G extra	9—12 0/0 Immedial Black NB or NG
8—10 0/0 common salt*)	6— 8 0/0 common salt*).

Enter the dry cotton into the boiling bath, and pole or broach for about 10 minutes, after which the vessel should be covered up with a perforated lid and the cotton be allowed to feed at the boil for $1\frac{1}{2}$ hour.

*) Glauber's salt may be used in place of common salt; 10 parts of the latter have the same effect as 12 parts desiccated or 24 parts crystallised Glauber's salt.

The dyeing operation may be shortened if desirable by increasing the amount of colour in the starting bath, whilst the other additions may remain the same.

Care should be taken during the dyeing process to keep the cotton always well immersed below the surface of the liquor.

The dyeing being completed, the cotton is lifted and the excess of dye liquor allowed to drain off into the dye vessel. The cotton is then well washed in the washing machine.

An excellent plan is also to run cold water over the dyed cotton; by allowing this to flow into the dye bath, a good deal of the liquor remaining in the cotton is saved.

The cotton may also be put straight from the dye bath into the hydroextractor, the extracted, coloured effluent be collected and re-added to the dye bath. A hydroextractor made of copper must not be used, as it would affect the dye liquor; iron hydroextractors are however very suitable. Any copper parts should be well tinned, a matter which entails but small expense.

The final washing of the cotton may then take place as usual in the hydroextractor or in a washing machine. In every case however it is essential that the cotton be thoroughly rinsed after dyeing.

For the dyeing of large quantities of loose cotton at a time, the dyeing plant should be suitably arranged, by sinking cisterns of equal capacity below the dye vats for saving the liquor. After having dyed Immedial Black in the top vat, the liquor is run off into the cistern below, cold water which also serves to replenish the dye liquor is run into the vessel, and the cotton then finally rinsed and aftertreated.

For dyeing subsequent lots, the liquor is raised again from the cistern into the dye vat and replenished as aforesaid according to requirement.

Aftertreatment.

In dyeing loose cotton an aftertreatment is usually dispensed with. Should this however be required in order to increase the intensity of the colour or the fastness to milling, the aftertreatment is carried out with either bichromate of potash alone or with bichromate of potash and chrome alum mixed, in either case with the addition of 3 % acetic acid as indicated on page 8.

During the aftertreatment, which need not last longer than 20 or 25 minutes, the temperature should not exceed 160—175° F.

The aftertreatment may also take place in the washing machine; in this case a temperature of 105—120° F. is sufficient for the bath.

The bath used for the aftertreatment should remain perfectly clear; any precipitate which may have formed may be easily brought into solution again by adding some more acetic acid.

If no ultimate softening of the loose cotton is to take place, it is well to take it finally, before drying, through a short rinsing bath containing 3—5 oz. acetate of soda per 10 gallons liquor, and then to dry without again rinsing.

Dyeing Immedial Blue C on Loose Cotton.

The dyeing is carried out similarly as described under Immedial Black, viz. boiling for about 10 minutes and allowing to exhaust in the hot liquor.

For 50 lbs loose cotton prepare the first bath with 80 gallons water,

- 1½— 2 lbs caustic soda 75° Tw.
- 4 6 „ sodium sulphide
- 5 —10 „ Immedial Blue C (according to the depth of shade)
- 5 —10 „ common salt*).

For subsequent lots add:

- | | | |
|------------------------------|---|--|
| 1— 1½ % caustic soda 75° Tw. | } | calculated on the weight
of the cotton. |
| 4— 8 % sodium sulphide | | |
| 5—15 % Immedial Blue C | | |
| 4— 6 % common salt*). | | |

During the dyeing process care should be taken to keep the cotton constantly below the surface of the liquor, which object is best attained by weighing it down with a perforated lid.

After dyeing, the cotton is well hydroextracted in an extractor constructed either of iron or tinned copper, then steamed without previous rinsing.

The extracted dye liquor is collected and added again to the dye bath.

*) See note on page 21.

Steaming of Loose Cotton.

Loose cotton is best steamed in a wooden chest, in which it is placed in layers on frames.

The method of admitting both steam and air has been described on page 11; as there indicated, the steaming lasts about $\frac{1}{2}$ hour, then the cotton is rinsed in warm water, softened, and dried.

Instead of by steaming, the developing may also be effected by smothering the moist cotton in a warm place.

The method of working is as follows:

The cotton is dyed as described above and then hydro-extracted without rinsing. While still warm, the cotton is packed into skeps, the inside of which is lined with oiled brown paper or „American cloth“. The skeps are well covered so as to prevent a cooling down or drying up of the contents, and placed for a few hours or overnight into the drying room.

The blue develops best in this way if the temperature of the drying room is somewhere about 140—160° F.

In the place of skeps, other receptacles may also be used, provided care is taken to prevent the cotton from becoming partially dry at the sides, and to preserve its heat for a few hours.

Finally, the cotton is removed from the skeps and rinsed as usual.

To match Immedial Blue dyeings, the undeveloped pattern drawn from the dye bath must be passed through weak acetic acid or a weak alum solution, and dried without being rinsed again.

This treatment ensures the stability of the shade.

The influence of the steaming on the shade being always exactly the same, it is sufficient to match the undeveloped dyeing.

Dyeing Immedial Brown B and Immedial Bronze A on Loose Cotton.

For 50 lbs cotton in about 80 gallons dye liquor, charge the starting bath:

For Immedial Brown B, according to the depth of shade, with:	For Immedial Bronze A, according to the depth of shade, with:
2— 4 lbs soda ash	2— 4 lbs soda ash
2— 4 „ sodium sulphide	1— 3 „ sodium sulphide
4— 8 „ Immedial Brown B	3— 5 „ Immedial Bronze A
20—40 „ common salt*)	10—20 „ common salt*).

For dyeing subsequent lots, the old bath has to be replenished with the following quantities calculated on the weight of the cotton:

1— 1½ ‰ soda ash	1— 1½ ‰ soda ash
2— 5 ‰ sodium sulphide	2— 4 ‰ sodium sulphide
6—12 ‰ Immedial Brown B	4— 8 ‰ Immedial Bronze A
6—12 ‰ common salt*)	3— 6 ‰ common salt*).

The details for dyeing are in other respects the same as for Immedial Black.

Both colours are usually dyed direct without any after-treatment; still it is important to know that deeper shades of a better resistance to light are obtained if the dyeings are treated for ½ hour at 175° F. with

- 1 ‰ sulphate of copper
- 2 ‰ bichromate of potash
- 3 ‰ acetic acid,

whilst an aftertreatment with Nitrazol C yields deep, more yellowish, shades. For this latter process we refer to page 13. Finally the cotton is well rinsed.

*) See note on page 21.

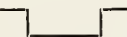
The Dyeing of Cotton Yarns.

Dyeing Immedial Black on Cotton Yarn.

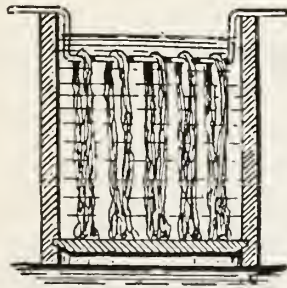
Immedial Black is best dyed in wooden or iron vats which should be provided with two small squeezing rollers at one of the narrow ends.

The provision, to free the hanks after dyeing of surplus dye liquor by means of squeezing rollers, was first recommended by us generally for the dyeing of the sulphur colours and has proved very effective; the production of level dyeings on cotton yarn is chiefly dependent on a thorough and even squeezing off.

It is a matter of experience with the dyers whether to use straight sticks or bent iron pipes for yarn dyeing; it is however advantageous to make use of the bent rods in the initial stages until the workmen become well acquainted with the process, or when the conditions as to evenness are very exacting.

For the required purpose, gas pipes of $\frac{3}{4}$ to 1 inch diameter are bent to this shape , fitted exactly to the inner width of the vessel, and wrapped with strips of cotton cloth round the parts on which the yarn rests.

For dyeing, the yarn is suspended on the bent rods same as on the straight sticks, in lots of 3—4 lbs per rod according to the width of the vat. The method of working with such rods is illustrated in the following sketch.



For dyeing 50 lbs yarn in about 100 gallons water, charge the starting bath:

for Immedial Black V, FF and G extra, with:	for Immedial Black NB, and NG, with:
5 lbs soda ash	5 lbs soda ash
5 „ sodium sulphide	7½ „ sodium sulphide
9—12 „ Immedial Black V, FF or G extra	9—12 „ Immedial Black NB or NG
35 „ common salt*)	35 „ common salt*).

For subsequent batches charge the old bath with the following quantities calculated on the weight of the dry yarn:

2 ‰ soda ash	2 ‰ soda ash
4—5 ‰ sodium sulphide	7—8 ‰ sodium sulphide
10—12 ‰ Immedial Black V, FF or G extra	10—12 ‰ Immedial Black NB or NG
6—8 ‰ common salt*)	6 ‰ common salt*).

When charged with all the ingredients, the bath is brought to the boil, steam shut off, and the previously well boiled yarn entered, turned 4 times in succession by means of a pointed broaching stick, and then only once about every 10 minutes.

The yarn is lifted stick by stick, each lot first receiving one or two turns, and then well squeezed by means of the two squeezing rollers fixed at the narrow end of the vat. After this the yarn must be quickly and thoroughly rinsed in tubs which should be placed close to the dye vessel.

Whilst working with bent rods, the hanks remain constantly covered by the dye liquor as long as the dyeing process lasts

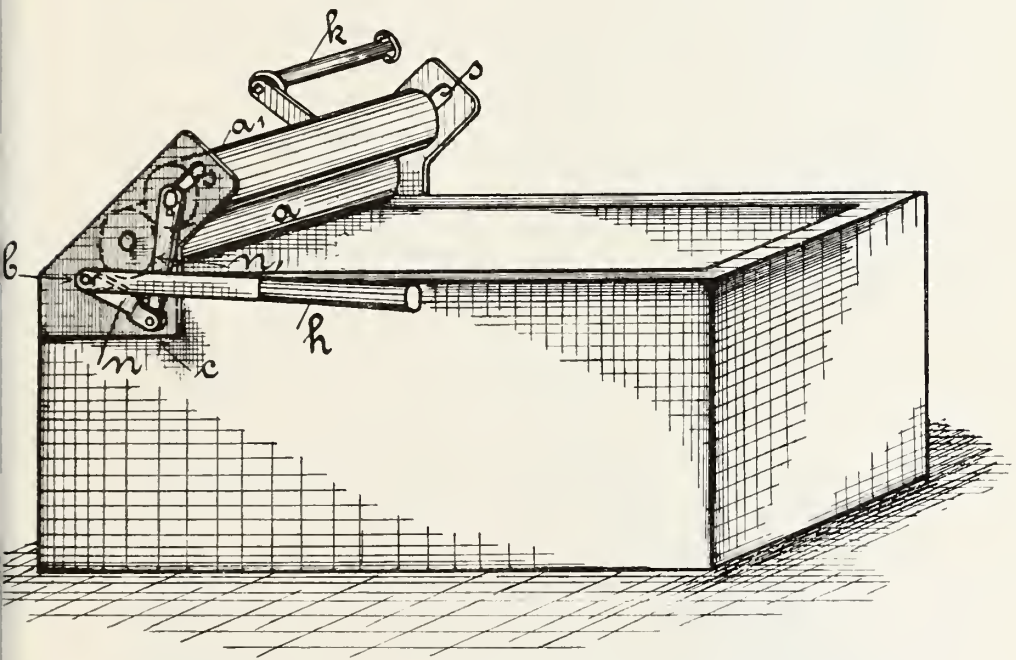
*) See note on page 21.

The bath may be controlled from time to time by means of the areometer as to its strength for salt; it should indicate no more than 9—10½ Tw. See page 5.

excepting the time when being turned. The working on straight sticks necessitates a turning every 10 minutes; frequently the hanks are immersed into the liquor after each turning.

In both cases the dyeing process lasts about $1-1\frac{1}{2}$ hour.

The following sketches show two special methods of arranging the squeezing rollers; both these systems have proved very effective in practical working, in addition to the well known system of two ordinary squeezing rollers.



An iron cheek with bearings for the rollers a and a_1 is fixed on each long side at one end of the tank, the bearings of the top roller being in the shape of a slit in which the roller glides when being lifted or lowered.

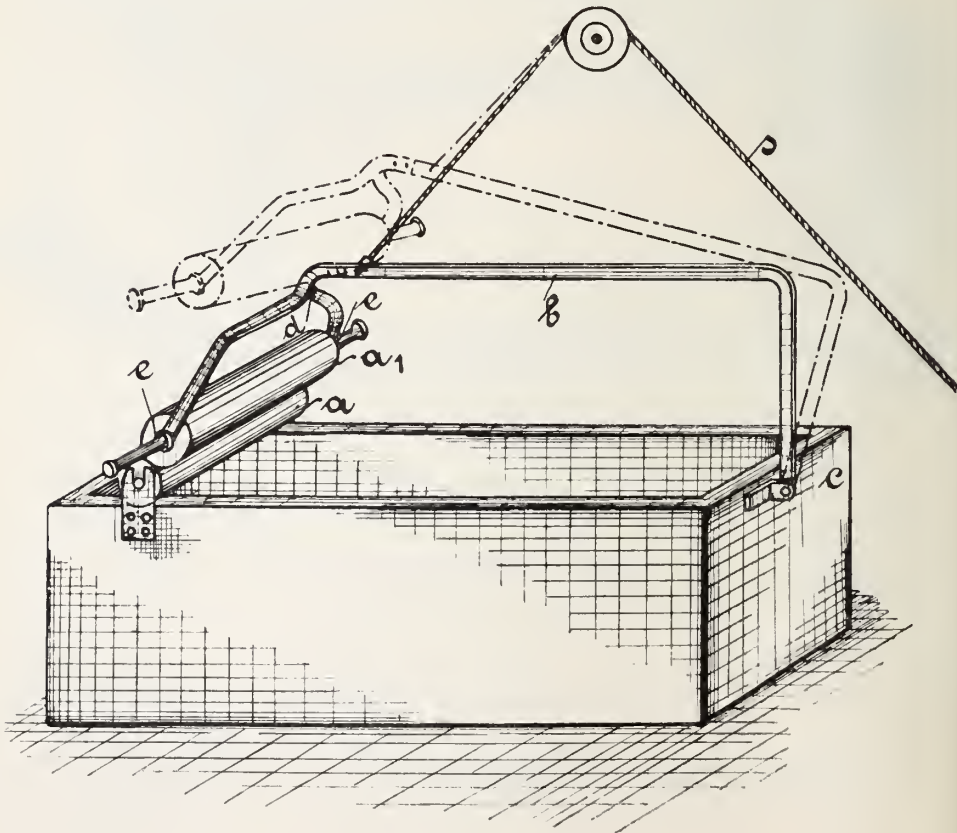
The top roller is raised and lowered by means of the arm of a lever h in connection with a knee joint lever n and m . The levers h and n are firmly joined at b , whilst there is a moveable joint at c for the levers n and m . A similar arrangement but without the lever arm is

fitted to the other side. Both sides are connected by a shaft, passing through *b* right across the bark, by which the lifting and the lowering of the top roller proceeds simultaneously from both sides. The bottom lever is provided with a crank *k*.

The method of working is as follows:

After completing the dyeing proper, the top roller *a* is lifted by raising the lever *h*, the stick carrying the yarn is passed between the two rollers and the yarn laid upon the bottom roller. Whilst one man is pressing down the lever *h*, another turns the crank *k*, and so the yarn passes between the rollers and is freed from the greater part of the liquor.

The second way of arranging the squeezing rollers is illustrated in the sketch below:



One of the narrow ends of the box is provided with a roller *a*, the opposite end carries an iron arm jointed at *c* which reaches the length of the bark and which is forked at *d*. The lower ends *e* of this fork are the bearings for a second roller *a*₁. Arm and roller *a*₁ can be raised together by means of the rope *s*.

The dyeing proper being completed, the arm is lowered until the roller *a*₁ rests upon the lower roller *a*, and the yarn is passed through, stick by stick, a raising of the top roller being thereby unnecessary.

Aftertreatment.

The aftertreatment with salts of chromium is chiefly applied to the brands V extra, FF extra and G extra, whilst it is frequently omitted with the brands NB and NG, though it makes them brighter and slightly bluer and may by reason of its simplicity be recommended in most cases.

The quantities for blue black are

3 % bichromate of potash

3 % acetic acid,

for jet black

1½ % chrome alum

1½ % bichromate of potash

3 % acetic acid,

working the cotton for 25—30 minutes in the hot bath, followed by rinsing.

The bath for aftertreatment should be perfectly clear; any precipitate may be easily re-dissolved by a further addition of some acetic acid.

The yarns, no matter whether dyed direct or aftertreated, should always be finally well washed. Unless they are brightened in some other way, they should be passed as a last rinsing through a bath containing 3½—5 oz acetate of soda per 10 gallons water and dried at once without rinsing again.

Brightening.

To increase the beauty of the shade, the yarns are often finally brightened, most frequently according to the following method:

The yarns are treated for 20 minutes at the boil in a bath prepared with

1—3 ‰ potato or wheat starch	} boiled together
1—3 ‰ suet or cocoanut oil	
calculated on the weight of the yarn	

and $3\frac{1}{2}$ —5 oz acetate of soda per 10 gallons liquid, and then dried without rinsing.

If a specially soft handle is to be imparted to the yarn, about $\frac{1}{2}$ ‰ of oil may be added to the above liquid, or, the brightening may be done by treating the yarn for 20 minutes at 160—175° F. in a bath previously softened with a little soda and charged with

$3\frac{1}{2}$ —5 oz soap	} per 10 gallons liquor.
$\frac{3}{4}$ „ oil	
$3\frac{1}{2}$ —5 „ acetate of soda	

Coming from this bath, the yarn should be dried without rinsing.

For imparting to yarns a silky scroop, the following two methods are chiefly employed:

Recipe A (principally for yarns intended for satin goods).

I. bath. The dyed and hydroextracted yarn is treated for $\frac{1}{4}$ hour in a bath of 120° F. containing

7—8 ‰ soap calculated on the weight of the material,
after which it is hydroextracted and treated in a

II. bath, which is made up with cold water and

$\frac{1}{2}$ —1 pint acetic acid 40 ‰	} per 10 gallons
8 oz — 1 lb acetate of soda	

or, for a permanent scroop, with:

$3\frac{1}{2}$ —5 oz tartaric acid	} per 10 gallons.
8 oz — 1 lb acetate of soda	

The yarn is turned for 10 minutes in this bath and dried without rinsing.

Recipe B (yielding particularly good results regarding scroop).

I. bath. The yarn being dyed and hydroextracted is treated for 20 minutes in a bath of 140° F. charged with

$1\frac{1}{2}\%$ starch
 $1\frac{1}{2}\%$ cocoanut oil
 $1\frac{1}{2}\%$ tannin

} calculated on the weight of the yarn,

after which it is hydroextracted and soaped in a

II. bath prepared with:

7—8% soap
1% starch

} calculated on the weight of the yarn,

in which the yarn is turned for 20 minutes at 140° F.
After being again hydroextracted, the yarn is entered into a cold

III. bath containing

5—8 oz tartaric acid
1 lb acetate of soda

} per 10 gallons;

after 10 minutes turning, the yarn is lifted, hydroextracted and dried without rinsing.

Dyeing Immedial Black on Mercerised Cotton Yarn.

Mercerised cotton yarn is dyed practically in the same manner as ordinary yarn, with the only difference that less colour and less salt are used.

For 50 lbs mercerised cotton yarn
in about 100 gallons dye liquor, charge the
starting bath:

for Immedial Black V, FF and G extra with	for Immedial Black NB and NG with
5 lbs soda ash	5 lbs soda ash
5 „ sodium sulphide	8 „ sodium sulphide
5—9 „ Immedial Black V, FF or G extra	7—9 „ Immedial Black NB or NG
10 „ common salt*) or desiccated Glauber's salt	10 „ common salt*) or desiccated Glauber's salt.

For dyeing subsequent lots in the old bath, add

2 ⁰ / ₀ soda ash	2 ⁰ / ₀ soda ash
5 ⁰ / ₀ sodium sulphide	8 ⁰ / ₀ sodium sulphide
7—9 ⁰ / ₀ Immedial Black V, FF or G extra	7—9 ⁰ / ₀ Immedial Black NB or NG
3 ⁰ / ₀ common salt*) or 3 ⁰ / ₀ desiccated Glauber's salt	3 ⁰ / ₀ common salt*) or 3 ⁰ / ₀ desiccated Glauber's salt

calculated on the weight of the goods.

*) See note on page 21.

For details of dyeing, aftertreating, and brightening, we refer to the chapter "Dyeing of Immedial Black on Cotton Yarn", pages 29—35, and supplement our remarks by stating that the best lustre is obtained if the temperature of both the dyeing and aftertreatment liquor be kept somewhat lower than there indicated. For the dyeing proper, 160—175° F., for the after-treatment 140—160° F., are sufficient.

The process may also be reversed, inasmuch as the yarns may first be dyed with Immedial Black and mercerised afterwards with caustic soda. As however by dyeing mercerised yarn a saving of at least 25 % dyestuff is effected, and as the lustre of the yarn is not in any way affected by the dyeing with Immedial Black, it will in the majority of cases be more advantageous to mercerise before the dyeing as is the general practice.

The silky scroop may be imparted to the mercerised yarns by working according to the details given for recipe B afore described.

Dyeing Immedial Blue C on Cotton Yarn.

Immedial Blue C like Immedial Black is dyed in vessels provided with squeezing rollers. It is immaterial whether bent rods or straight sticks are used; evenness is however best obtained with bent rods.

For 50 lbs yarn in about 100 gallons water
charge the starting bath with:

- $\frac{1}{2}$ — 2 lbs caustic soda 75° Tw.
- 4— 7 „ sodium sulphide
- 5—10 „ Immedial Blue C (according to the depth of shade)
- 5—10 „ cryst. Glauber's salt.

For succeeding batches, the bath is replenished with the following quantities calculated on the weight of the yarn:

- 1— 2% caustic soda 75° Tw.
- 4— 8% sodium sulphide
- 6—14% Immedial Blue C (according to the depth of shade)
- 2— 3% cryst. Glauber's salt.*)

When charged with all the ingredients, the bath is boiled up, steam shut off, the previously well boiled off yarn entered and turned first 4—6 times in succession by means of a pointed broaching stick, afterwards once every 5 or 10 minutes, and dyeing completed in about $\frac{3}{4}$ to 1 hour without re-heating the bath.

On being lifted from the bath after dyeing, the yarn is passed through the squeezing rollers (see pp. 31—32) and without being rinsed is wrung off and straightened out three times as sharply and quickly as possible, and put into the steam chest.

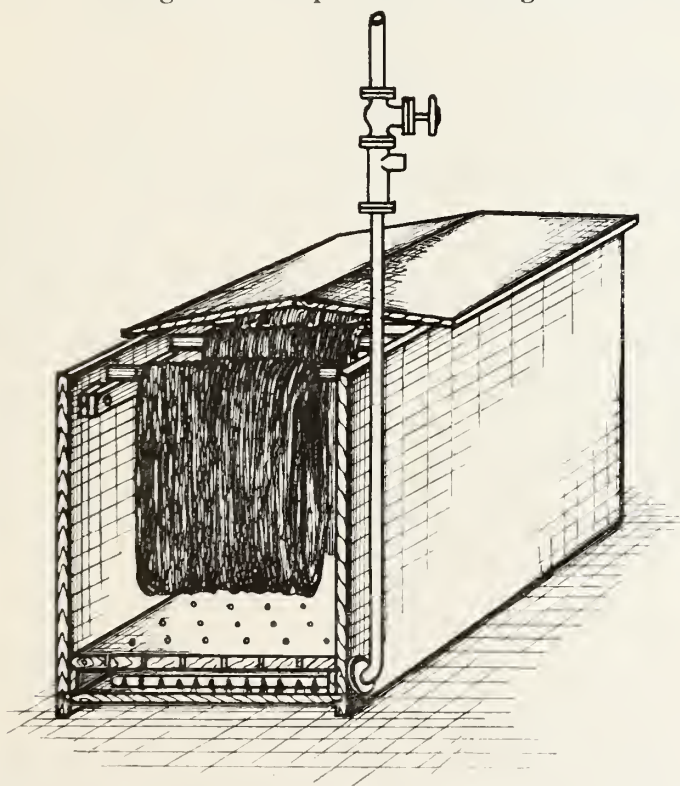
*) To prevent the bath from becoming overcharged with salt, the addition of Glauber's salt is often entirely dispensed with.

Steaming of the Dyeings.

The steaming of the dyeings is described on pp. 10—12 and is best carried out in a dye vessel provided with an inner rail and a perforated false bottom. The yarns are suspended in this vessel in such a way as to be clear of the perforated bottom by at least $3\frac{1}{2}$ in. It is well to heat the steam chest before charging it with the yarn which must be protected against drops caused by condensed steam.

The cover of the steam chest, which is lined with cloth fastened on to a wooden frame, should best have the form of a slightly overlapping roof.

The following sketch explains the arrangement.



The yarns are suspended in the chest on ordinary sticks similarly as for dyeing; the cover having been put on, both steam and air are admitted. After steaming for $\frac{1}{2}$ — $\frac{3}{4}$ hour, the blue will be completely developed; the yarns are then removed and rinsed in warm water.

Developing with Peroxides of Sodium or Hydrogen.

The blue may also be developed by the application of the peroxides of either sodium or hydrogen; the fact however that the steaming is a cheaper and less complicated process accounts for the diminishing employment of these chemicals.

Developing with Sodium Peroxide.

A wooden vessel containing as little cold water as necessary is charged:

for pale shades with	{	$1\frac{1}{2}$ % sodium peroxide
	{	$1\frac{1}{2}$ % sulphuric acid 170° Tw.
for medium and	{	$2-2\frac{1}{2}$ % sodium peroxide
dark shades with	{	$2-2\frac{1}{2}$ % sulphuric acid 170° Tw.

The acid is added first to the bath, in which the yarn is given a few turns; then the sodium peroxide which has been previously dissolved in cold water is added, while the yarn is raised from the bath which is now ready for developing the colour. The yarn is turned for about $\frac{1}{4}$ hour and the bath subsequently heated during 20 minutes gradually to about 140°F. The usual rinsing and hot soaping completes the process.

N. B. The bath should remain slightly alkaline and should therefore not redden blue litmus paper.

If peroxide of hydrogen is substituted by sodium peroxide, the proportions are as follows:

for pale shades	{	12 — 20 % hydrogen peroxide
	{	$1\frac{1}{2}$ — 2 % ammonia
for medium and	{	20 — 25 % hydrogen peroxide
dark shades	{	2 — $2\frac{1}{2}$ % ammonia.

Larger quantities of the peroxides than stated above increase the brightness of the dyeings, diminish however their fastness to washing.

N. B. The vessel used for developing with sodium peroxide should be perfectly clean and should best be boiled out with some sodium peroxide and sulphuric acid.

Immedial Blue C as Bottom for Indigo.

Regarding the method of working this important combination we refer to page 16.

Topping Immedial Blue with Basic Colours.

Whereas dyeings topped with Indigo do not necessarily require a topping of basic colours, their effect on steam developed blue is very prominent.

The various brands of New Methylene Blue as also Indazine M and Naphtindone BB have been found specially suitable. The latter gives chiefly in deep shades the coppery appearance so much liked with Indigo dyeings.

The topping is done in a cold bath containing acetic acid or sulphate of alumina, the colour being added in several lots. As soon as it is exhausted, heat is applied and the yarn worked for another 10 or 15 minutes. The yarn is then well rinsed and dried.

The matching of Immedial Blue dyeings is best done by passing a dyed still undeveloped sample through dilute acetic acid or a weak solution of alum, and drying the same without rinsing. This treatment prevents any change in shade.

As the effect of steam on the shade is always exactly the same, a matching of the undeveloped dyeings is sufficient.

Dyeing Immedial Brown B and Immedial Bronze A on Cotton Yarn.

The dyeing of yarns is carried out similarly as described under Immedial Black, viz, on straight sticks, in vessels provided with squeezing rollers.

For 50 lbs cotton yarn

charge the

starting bath:

for Immedial Brown B, according to the depth of shade, with	for Immedial Bronze A, according to the depth of shade, with
3— 5 lbs soda ash	2 — 4 lbs soda ash
3— 5 „ sodium sulphide	1½— 3 „ sodium sulphide
4— 8 „ Immedial Brown B	3 — 5 „ Immedial Bronze A
20—40 „ common salt*)	10 —20 „ common salt.*)

For subsequent lots the old bath is freshened up with the following quantities, calculated on the weight of the yarn:

2— 3% soda ash	1 —2% soda ash
3— 4% sodium sulphide	1½—3% sodium sulphide
6—12% Immedial Brown B	4 — 8% Immedial Bronze A
5— 8% common salt*)	2 —4% common salt.*)

These dyeings are generally not aftertreated.

It must however be observed that half an hour's treatment at 175° F. with

1% sulphate of copper
2% bichromate of potash
3% acetic acid

yields deeper shades of better fastness to light, whilst the coupling with Nitrazol C produces much richer and yellower shades than originally. The methods of applying these after-treatments have been described on pp. 8 and 13. The yarns are finally well rinsed.

*) See note on page 21.

The Dyeing of Loose Cotton, Sliver, Roving,
Yarns, Cheeses, and Cops
in
Dyeing Machines.

Dyeing of Immedial Black in Dyeing Machines.

(Loose Cotton, Sliver, Roving, Yarns, Cheeses, and Cops.)

Immedial Black is dyed to such a great extent in dyeing machines of all kinds that it may be said to have given a powerful impetus to machine dyeing generally, and this has especially been the case since yarns have also of late been frequently and most successfully dyed with Immedial Colours in various dyeing machines.

The choice of the required machine is principally dependent upon the material to be dyed.

It is however conditional that there be no copper fittings in the machines and that the admission of the liquor be not effected by means of air pressure but by means of a pump or steam pressure.

The machines may be constructed of wood or iron, and the spindles of nickel-plated iron wire or sheet iron; machines already in use made of material containing copper should be nickel-plated.

Great care should be taken that the water be free from lime, this condition being essential for machine dyeing with any colouring matter whatever. If such water is not obtainable or there be difficulties, connected with the supplying of condensed water, it is usual before preparing the bath, to boil it up first with the addition of soda ash and to add sodium sulphide and the dyestuff afterwards. Condensed water is however available in large quantities in most dye houses and may be easily collected for the purpose of machine dyeing.

Dyeing in cop-dyeing machines which circulate the dye liquor either by means of a pump or by suction and air pressure, is carried out similarly as before described. In machines, however, where air pressure is otherwise used, the drawing up of the dye liquor may be effected by vacuum, whilst for forcing the liquor through the goods, air pressure must always be substituted by steam pressure.

Charge the first bath for instance with:

35 lbs Immedial Black FF extra, or,	35 lbs Immedial Black NB
13 „ sodium sulphide	17 ¹ / ₂ „ sodium sulphide
13 „ soda ash	13 „ soda ash
22 „ cryst. Glauber's salt	18 „ cryst. Glauber's salt

For continuing in the same bath add:

9 0/0 Immedial Black FF extra, or,	9 0/0 Immedial Black NB
4 0/0 sodium sulphide	5 0/0 sodium sulphide
4 0/0 soda ash	4 0/0 soda ash
4 0/0 cryst. Glauber's salt	3 0/0 cryst. Glauber's salt.

The dye bath is first charged with the necessary quantities of soda ash and Glauber's salt and one half of the dyestuff and sodium sulphide required, and after the liquor has been drawn once through the cops into the dye tank, the other half of the colouring matter and sodium sulphide is added direct to the liquor in this tank.

The dyeing is done at the boil, suction by vacuum and pressure by steam moving the dye liquor alternately. The duration of the dyeing process varies according to the speed with which the liquor is forced through the goods; it may however be assumed that in the majority of cases 6—8 successive circulations of the liquor will suffice.

The dyeing itself being finished, the liquor is removed and replaced at once by cold water, which is forced through the cops. The first and strongly stained rinsing water is run back into the dye tank and the cops are then thoroughly rinsed with lukewarm water until it runs off colourless.

The duration of the dyeing process in dyeing machines may if necessary be materially reduced; sliver for instance may be dyed in the Mattei machine with one passage only, by charging

the 1st element with Immedial Black, using
" 2nd " for rinsing,
" 3rd " for aftertreating, and
" 4th and 5th elements for rinsing.

With other machines the dyeing process may also be shortened, depending on their construction, and the strength of the dye liquor need only be increased accordingly.

The same may be said about the temperature; sliver is quite frequently entered at about 180° F. and left for 30 or 40 minutes in the bath without raising the temperature.

Regarding the aftertreatment with chromium salts we refer to the instructions on the aftertreatment of hank dyeings on page 33.

Whenever the dyeings are not aftertreated, it is of great importance that the goods be very thoroughly rinsed after dyeing.

All the dyeings, whether aftertreated or not, should be rinsed with an addition of 3—5 oz acetate of soda per 10 gallons water to the last rinsing bath; after a short treatment in this solution they are dried without any further rinsing.

Iron machines when being stopped, even for the night only, should be well cleaned with a solution of soda ash and be rubbed dry to prevent rusting.

Dyeing Immedial Blue C in Dyeing Machines.

(Loose Cotton, Sliver, Roving, Yarn, Cheeses and Cops.)

Immedial Blue C may be dyed in any kind of dyeing machine provided that no parts of the same are made of copper and that the admission of the liquor during the process of dyeing is effected by steam pressure or a pump, but not by means of air pressure.

The goods to be dyed must be completely covered by the liquor, of which there should be a plentiful supply, this precaution being also a means of preventing the periodical spouting of the dye liquor.

The machines may be constructed either of wood or iron, the spindles of nickel-plated iron wire or sheet iron; if made of metal containing copper, they must be nickel-plated.

The following approximate proportions per 10 gallons dye liquor serve as a guide for the starting bath:

- 5 — 8 oz sodium sulphide
- 3 — 5 " caustic soda 75° Tw.
- 6¹/₂ — 8 " cryst. Glauber's salt
- 15 — 20 % Immedial Blue C calculated on the weight
of the material to be dyed, but at
least 1 lb 3 oz to 1¹/₂ lbs dyestuff
per 10 gallons.

For subsequent lots the bath should be replenished with:

6— 8	% sodium sulphide	} calculated on the weight of the cotton to be dyed.
1— 1½	% caustic soda 75° Tw.	
7—15	% Immedial Blue C, pat. according to the depth of shade required	

When charged, the dye bath is boiled up, the goods entered and dyed for ½ hour near boiling point.

On completing the dyeing operation, the dye liquor is run off into a reservoir to be kept for further use, and the dyed material is freed as well as possible from the adhering dye liquor either by means of hydroextracting, suction, or steam blowing, after which it is steamed, with admission of air without being previously rinsed.

Goods which have been dyed in machines not admitting of the dye liquor being sufficiently well extracted must be rinsed with a solution containing per 10 gallons

3 oz sodium sulphide and
3 „ caustic soda 75° Tw.

A few minutes' treatment is sufficient, and the liquor must not be heated. After running this liquor off, the goods are steamed.

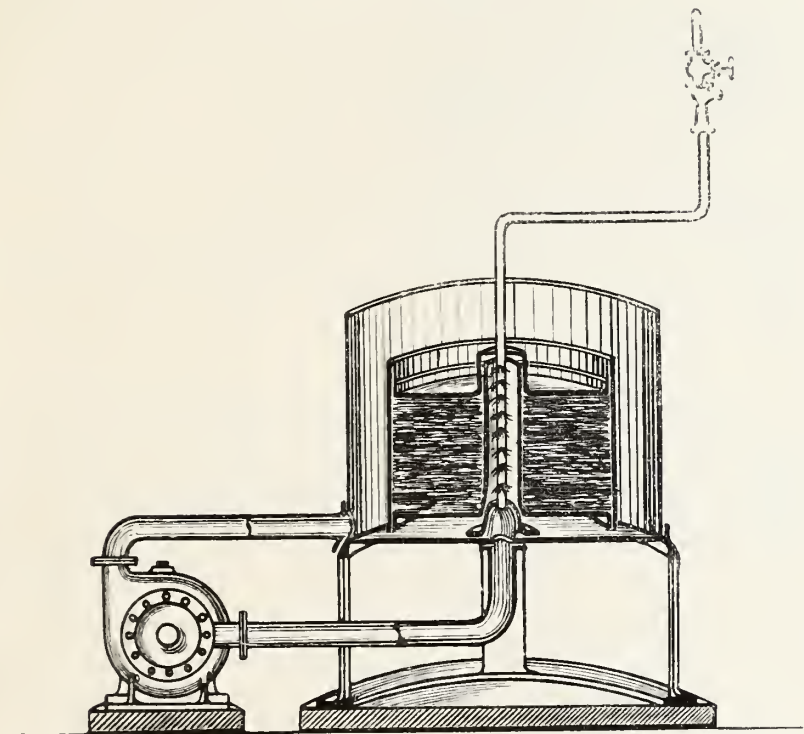
We have to point out that rinsing in plain water cannot be recommended, as in such case the blue does not develop as well.

The steaming may be done in the dyeing machine proper, air and steam being admitted simultaneously; the adjusting of the injector has been described on page 11.

The duration of the steaming process is from ½ to ¾, or even 1 hour.

The pipe with the injector for steaming may easily be adjusted to any existing machine, but the conduit should be so arranged that the steam enters as direct as possible into the interior of the hollow cylinder to effect an easy penetration of the dyed and partly desiccated goods.

The following sketch, being a reproduction of the well known Obermaier dyeing machine, gives an idea of how the steam and air conduit should be fixed.



Cops may be dyed with Immedial Blue C in the various machines as follows:

Starting bath for 50 lbs cops:

- 90 gallons water
- 3— 4 lbs soda ash
- 4— 6 „ sodium sulphide
- 3— 4 „ caustic soda 75° Tw.
- 8—10 „ Immedial Blue C.

For continuing in the same bath:

- 1½— 2 0/0 caustic soda 75° Tw.
- 6 — 8 0/0 sodium sulphide
- 8 —12 0/0 Immedial Blue C.

Dye for about $\frac{3}{4}$ hour at the boil. Machines dependent on the action of pumps must be worked as described on pp. 49—51; other kinds of machines with suction and air pressure may be left to work with a vacuum for the suction, whilst the air pressure must be replaced by steam pressure, the use of compressed air being detrimental.

After dyeing, the liquor is drawn off by means of a vacuum and well blown off afterwards by means of compressed air. After this the goods are steamed for $\frac{3}{4}$ hour.

The admission of steam and air (by means of the small injector) is so arranged as to make it enter direct into the interior of the cops holder.

The steaming is followed by a rinsing with warm water and if necessary by a topping with New Methylene Blue with addition of some acetic acid. The topping may however be done in a soap bath if sufficient soft water be available.

Dyeing Immedial Brown B and Immedial Bronze A in Dyeing Machines.

Both Immedial Brown B and Immedial Bronze A are extensively employed for dyeing sliver, cheeses and cops: the method of application is extremely simple.

Starting bath:

5—8 oz soda ash	} per 10 gallons dye liquor.
6—9 „ sodium sulphide	
1—2 lbs cryst. Glauber's salt	
10—20 % Immedial Brown B or Immedial Bronze A.	

For continuin'g in the same bath:

2— 3 % soda ash
3— 5 % sodium sulphide
5—10 % cryst. Glauber's salt
6—15 % Immedial Brown B or Immedial Bronze A.

The method of dyeing is exactly the same as for Immedial Black.

The aftertreatment with metallic salts is of minor importance, but a treatment with Nitrazol C yields very fine golden brown shades. The method of working the coupling process with Nitrazol in dyeing machines is the following:

The Nitrazol previously dissolved (see page 13) is added to the cold bath, allowed to act for 5 minutes, after which acetate of soda and soda ash are added. After another 10 or 15 minutes the liquor is run off and the cotton rinsed as usual.

For the necessary quantities of Nitrazol, acetate of soda, and soda ash we refer to page 13.

The Dyeing of Cotton Warps.

Dyeing of Cotton Warps with Immedial Black.

The dyeing of Immedial Black in warp dyeing machines is very simple and may be effected in any of the machines described below.

In case the warps are not boiled off previous to dyeing, care should be taken that the dye bath be gently simmering whilst the warps are passing through.

It is of no consequence whether the warps be treated or not after dyeing with salts of chromium, it is however of primary importance that they be well washed subsequent to both dyeing and aftertreating. In order to attain the desired effect of a thorough rinsing, the last water should contain some acetate of soda, and the warps be dried without any further rinsing. If the warps, however, are to be sized after dyeing, the acetate of soda may be added to the size instead of to the rinsing liquor.

I. Dyeing in the common or small Warp Dyeing Machine.

Starting bath:

5 oz soda ash	} per 10 gallons liquor.
3 „ Turkey red oil	
3—3½ lbs Immedial Black NB or NG	
1 lb 3 oz—1 lb 6 oz sodium sulphide	
5 „ dextrine	
3 lbs desiccated Glauber's salt or common salt	

For subsequent lots the following quantities, calculated on the weight of the warps, are added:

½ % soda ash
1 % Turkey red oil
10—12 % Immedial Black NB or NG
6—7 % sodium sulphide
½ % dextrine
3 % desiccated Glauber's salt or common salt.

The warp passes, according to the size of the machine, twice to four times through the warm dye liquor. After each passage it is squeezed off and finally entered into a rinsing liquor which is continually renewed by a current of fresh water. Afterwards the warp must however be washed thoroughly once more.

It is a frequent occurrence that the bath of the small warp dyeing machines becomes oversaturated with salt. It is therefore advisable to ascertain its strength of salt frequently by means of the aræometer. The bath should not show more than 10—12° Tw.

Aftertreatment.

Any aftertreatment, if desired, should for choice take place in a bath charged with

1½ % bichrome

1½ % chrome alum

3 % acetic acid

giving two passages in a warm bath and adding one half of the above ingredients for each end. Afterwards the warps are well rinsed and sized.

If the warps are not treated with an alkaline size, they should ultimately be saturated with a solution of 5—8 oz acetate of soda per 10 gallons water and be dried straight out without any further rinsing.

II. Dyeing over the Winch.

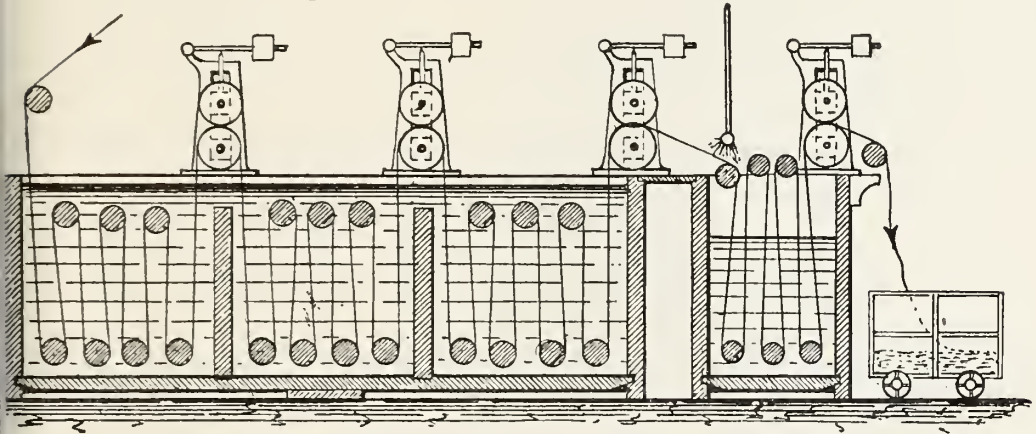
The warps are dyed in the rope, by entering them at the boil, same as in yarn dyeing, and giving them a few turns, after which they are left immersed and completely covered by the liquor for about ¾ hour without further heating, during which time it is advantageous to give them an occasional turn over the winch.

After dyeing the goods are taken straight from the dye vat through a pair of nippers into a rinsing vat.

After another thorough rinsing the warps may be after-treated as described above.

III. Dyeing in the Continuous Warp Dyeing Machine.

This machine consists of a system of three boxes connected with each other, each having a capacity of about 200 or 220 gallons. A fourth box serves for washing. Further details may be seen from the following sketch.



This machine differs from the ordinary continuous warp dyeing machine by the upper guiding rollers being completely covered by the liquor also.

The first three boxes contain the dyeliquor and may be so constructed as to communicate with each other, the liquor either circulating through the perforated dividing boards or flowing over.

The fourth box serves for rinsing only.

The dye liquor is prepared as follows:

Starting bath:

**For Immedial Black
V, FF, or G extra.**

5 oz soda ash	} per 10 gallons dye liquor.
2 ¹ / ₂ — 3 lbs Immedial Black V, FF, or G extra	
9 ¹ / ₂ — 12 ³ / ₄ oz sodium sulphide	
2 lbs desiccated Glauber's salt or common salt	

**For Immedial Black
NB or NG.**

5 oz soda ash	} 1 — 1 ¹ / ₄ „ sodium sulphide 2 „ desiccated Glauber's salt or common salt.
2 ¹ / ₂ — 3 lbs Immedial Black NB or NG	

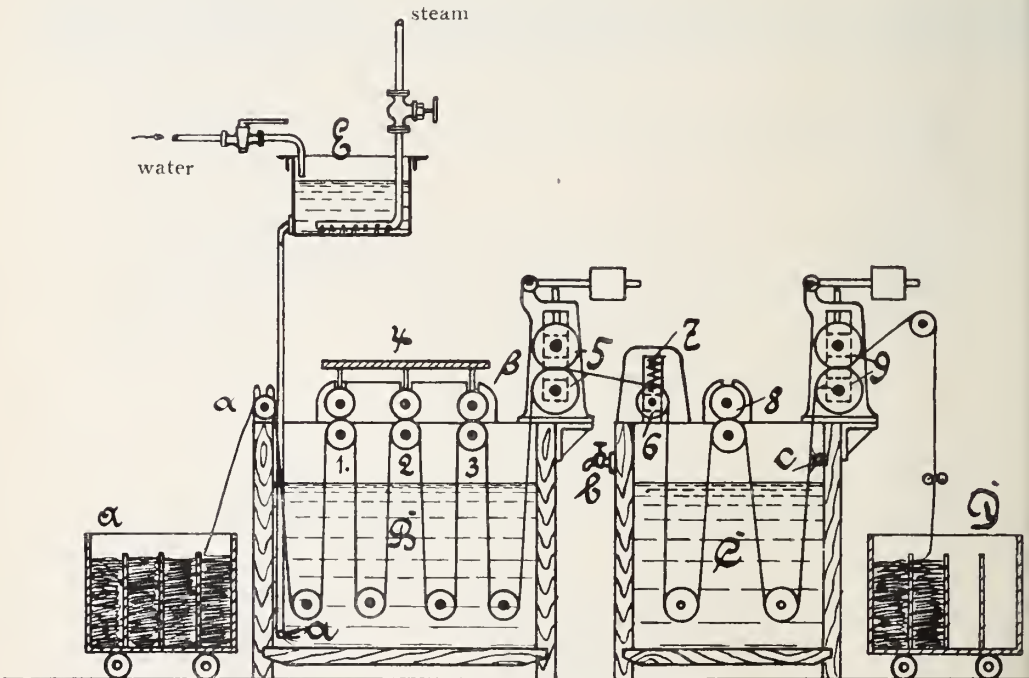
For continuing in the same bath, the quantities calculated on the weight of the warps are:

$\frac{1}{2}$ % soda ash	$\frac{1}{2}$ % soda ash
5—6 % sodium sulphide	6—8 % sodium sulphide
10—12 % Immedial Black V, FF or G extra	10—12 % Immedial Black NB or NG
3 % Glauber's salt or common salt	3 % Glauber's salt or common salt.

The warp passes through the boiling dye bath in about 3—4 minutes and is rinsed well with cold water in the fourth box.

The aftertreatment is the same as sub I on page 58.

We can also recommend the following warp dyeing machine as being of a simple construction.



A Is a truck with 6 or 8 divisions, each containing one boiled off warp.

B Dye box.

C Rinsing box.

D Truck.

E Tub with water and steam fittings for continuous feeding.

1. 2. 3 are pairs of wooden nippers which are uniformly weighted by 4.

5 are larger nippers made of iron and well wrapped with cloth.

6 is a wooden roller resting on spiral springs 7. This roller serves for regulating the tension of the warp, as it gives both ways, according to the strain or slackness of the warp.

8 are two lightly weighted wooden rollers.

9 are larger iron nippers, same as 5;

a feeding pipe for the colour solution,

b and c waste and feed pipe of rinsing water.

The driving of 9 is effected from 5 by means of mitred cogwheels.

The speed of the machine is so regulated that the warp takes 2 minutes to travel the distance from α to β .

The starting bath is charged approximately as follow:

200 gallons water

10 lbs soda ash

20 „ sodium sulphide

140 „ Glauber's salt cryst.

70 „ Immedial Black NB.

When dyeing in the standing bath the continuous feed for the following four warps N° 45 single of 100 lbs weight is

20 gallons water

2 lbs soda ash

4 „ sodium sulphide

14 „ Glauber's salt cryst.

14 „ Immedial Black NB.

As soon as the warps have passed the dyeing machine, they are taken to the small warp dyeing machine to be rinsed and aftertreated as described under I (page 58).

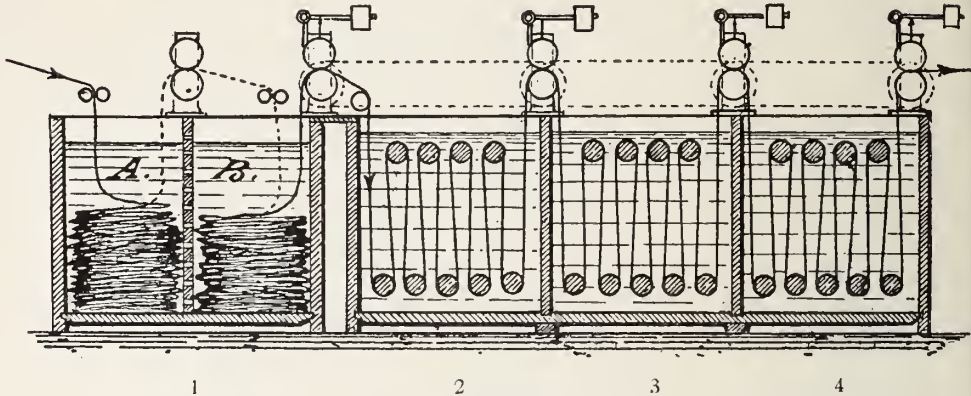
In this machine from 6 to 8 warps may be dyed simultaneously side by side, the succeeding warps being tied to the ends of the preceding lots.

The daily output of the machine is about 1200 to 2000 lbs weight of warps.

IV. Dyeing in the Continuous Warp Dyeing Machine, combined with Submersion of the Warps.

This machine, pretty extensively used for warp dyeing, is also serviceable for dyeing Immedial Black; there must, however, a pair of squeezing rollers be affixed at the end of the dye vat.

The following description will serve to explain the sketch:



1. Is a large dye vessel divided in two; each half containing 4—6 subdivisions with perforated boards, for submerging the warps.

By means of small guiding rollers, the warp is first deposited in *A*, from there in *B* and back again.

Four ends are sufficient for dyeing the warps which are rinsed in the rinsing vat 2.

It is immaterial whether the warp enters the rinsing vat from either *A* or *B*, provided it is well squeezed off when leaving the dye bath.

2. Is a rinsing vat which should be provided with well acting spray pipes. To effect a more thorough rinsing, the round rollers may be replaced by quadrangular or hexagonal rollers.
3. and 4. are vessels for aftertreatment and rinsing.

To dye say **400 lbs** of warp, the bath is approximately charged with:

600 gallons water
 20 lbs soda ash
 20 „ sodium sulphide
 100 „ common salt
 56 „ Immedial Black

Dye at the boil in four ends, rinse thoroughly and after-treat as described on page 58.

For the following lots add to the bath:

2 0/0 soda ash	} calculated on the weight of the warps,
4 0/0 sodium sulphide	
9–10 0/0 Immedial Black	
5 0/0 common salt	

And aftertreat with acetate of soda as described under I.

V. Dyeing beamed Warps in Warp Dyeing Machines.

Warps are frequently dyed on the beam with Immedial Black in special machines, such as are built, amongst others, by the „Zittauer Maschinenfabrik“.

The dye bath is charged for the

starting bath with:

35 lbs Immedial Black FF extra, or,	35 lbs Immedial Black NB
17 1/2 „ sodium sulphide	22 „ sodium sulphide
13 1/4 „ soda ash	13 1/4 „ soda ash
22 „ Glauber's salt cryst.	17 1/2 „ Glauber's salt cryst.

and for following lots with:

10 0/0 Immedial Black FF extra or	10 0/0 Immedial Black NB
5 0/0 sodium sulphide	7 0/0 sodium sulphide
4 0/0 soda ash	4 0/0 soda ash
4 0/0 Glauber's salt cryst.	3 0/0 Glauber's salt cryst.

Charge the liquor in the through with the requisite quantities of soda and Glauber's salt, together with half the quantities

of dyestuff and sodium sulphide necessary and draw it by suction through the warp into the dye vat proper, to which the remainder of dyestuff and sodium sulphide are added direct.

The dyeing is conducted at the boil, the liquor being drawn by vacuum and returned by steam pressure. The dyeing operation lasts from 1—2½ hours according to the size of the warp, which should always remain covered by the dye liquor.

On the dyeing operation being concluded, the warp is lifted and immediately washed by cold water being forced through the same. The first rinsing water, being rather strongly coloured, is allowed to run back into the dyeing machine, and the rinsing continued twice or three times in warm water, until the warp is perfectly clean.

VI. Dyeing Warps in the Sizing Machine.

Warps may also be dyed in the sizing machine itself for which purpose three small wooden troughs are placed between the warp beams and the sizing trough. The first and second trough serve for dyeing, the third for rinsing.

The two dye troughs are charged approximately with:

3	—3½ lbs	Immedial Black	}	pro 10 gallons
13 oz	—1 lb	sodium sulphide		
	8 oz	soda ash		
	3 lbs	common salt.		

For replacing the colour absorbed by the fibre, a solution of

9 %	Immedial Black	}	calculated on the weight of the warp to be dyed.
2 %	soda ash		
2 %	sodium sulphide		
3 %	common salt		

is run into both troughs.

The warp, having passed the dye troughs which should be fitted with well acting nippers, is rinsed in the third trough and sized immediately with an addition of acetate of soda.

Dyeing of Cotton Warps with Immedial Blue C, pat.

Cotton warps may be dyed with Immedial Blue C in exactly the same machines as described for Immedial Black, with the only difference, that the warps must always be thoroughly squeezed off after dyeing, but not be rinsed.

1. In the common, small Warp Dyeing Machine.

The bath is charged with

1½—2	lbs	Immedial Blue C	} per 10 gallons liquor.
13 oz—1	lb 3 oz	sodium sulphide	
3—6½	oz	caustic soda 75° Tw.	

To keep the bath at the required strength, it is to be replenished during the passage of the warps with a solution of

7	—12 %	Immedial Blue C
4	— 8 %	sodium sulphide
1½— 2	%	caustic soda 75° Tw.

According to the length of the machine, the warp is passed through two to four times at the boil. The warp is squeezed after each end and finally steamed without previous rinsing.

2. Over the winch.

The dyeing over the winch is exactly analogous to the dyeing of Immedial Black in the same machine.

3. In the Continuous Warp Dyeing Machine.

The same machine as described on page 59 for dyeing Immedial Black may be employed, the rinsing of the warp being however omitted.

The dye bath (first or starting bath) is prepared for every 10 gallons with:

13 oz—	1 lb 10 oz	Immedial Blue C pat.
5	—	10 „ sodium sulphide
3	—	6 ¹ / ₂ „ caustic soda 75° Tw.

one passage at the boil being sufficient. When dyeing in the standing bath it should be replenished with the quantities indicated on page 65 for this purpose.

After dyeing the well squeezed off warp is steamed without previous rinsing.

The developing of the warp dyeings into Blue by steaming is effected in a similar way as described for yarn. The warps being well squeezed after the last passage, by means of well wrapped nippers, are put into a suitable truck which possesses sufficient openings for the admission of steam, and which is run into the steam chest.

For details relating to the steaming process we refer to the previous chapter (page 39) in which the steaming of yarn is described.

In the majority of cases it is sufficient already if the well squeezed warp still warm, as it leaves the dyeing machine, and not rinsed, is put into a truck, well covered up and left for a few hours or over night in a warm room, to effect the perfect development of the Blue, as it is described in detail on page 12.

Dyeing beamed Warps in the Warp Dyeing Machine.

The quantities for a 100 lbs warp are for the starting bath:

180	gallons	water
6—8	lbs	soda ash
8—12	„	sodium sulphide
6—8	„	caustic soda 75° Tw.
16—20	„	Immedial Blue C pat.

For continuing in the same bath:

- 1½ — 2 % caustic soda 75° Tw.
- 6 — 8 % sodium sulphide
- 8 — 12 % Immedial Blue C, pat.

Dye at the boil for about 1½ hour, whilst the liquor is drawn by vacuum and returned by steam pressure.

After dyeing the beam is lifted, the liquor drawn from it first by vacuum, and then by air pressure, so that it may retain as little dye liquor as possible.

The steaming of the warp is also done on the beam and the admission of both steam and air (by means of the injector) is so arranged, that both enter direct into the central cavity of the beam and by the aid of sufficient pressure penetrate the warp thoroughly.

If the warp be too bulky so that penetration might be a matter of difficulty, it is advisable to place the whole beam in a small well covered box and to blow the steam both into the central cavity and also into the steam box.

Combination of Immedial Blue C with Indigo, on Cotton Warps.

If the warps, bottomed with Immedial Blue C are to be topped with Indigo, the method of working is to bottom the warps with Immedial Blue in one of the machines described on pages 65—67, leaving them unrinsed in a warm room for 1—2 hours, and ultimately topping them in the Indigo vat.

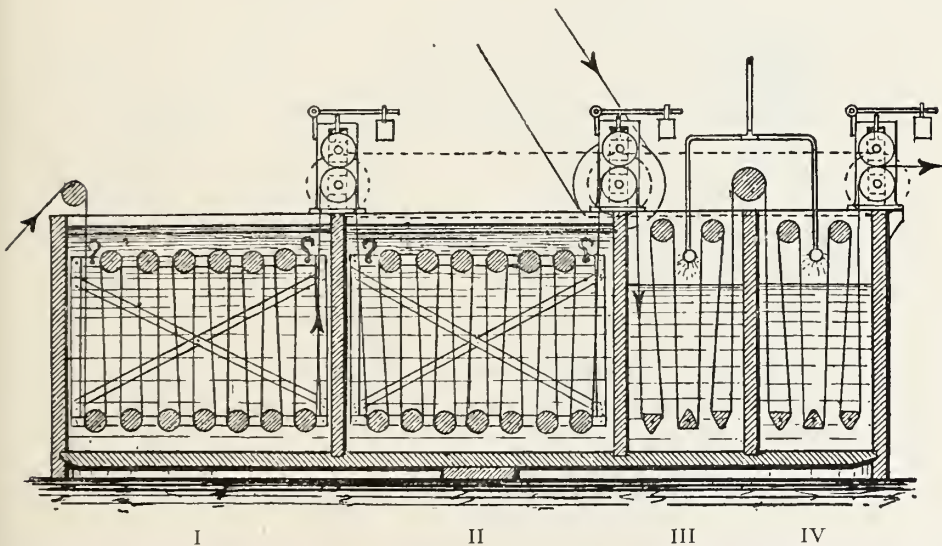
Dyeing of Piece Goods.

Dyeing Immedial Black on Piece Goods.

Piece goods are dyed with Immedial Black either in a continuous machine or in a jigger, the former being best suited for bulk dyeing, whilst the latter answers better for ordinary requirements.

A. Dyeing in the Continuous Machine.

The sketch below shows the constructive arrangement of a suitable continuous machine.



I and II are boxes for dyeing, with a system of rollers. The roller bearings are fixed in an iron frame which may be lifted at will.

The dividing board of the two boxes may with advantage be perforated, in order to allow the liquor to circulate.

III and IV are the usual rinsing boxes.

The boxes may be made of either iron or wood, whilst the inside rollers should be made of iron. The squeezing rollers may be made either both of wood, or else the lower one of wood and the upper one of iron. They should in any case be well wrapped with cloth.

As for the dyeing process, the goods, previously boiled off, are run either dry or well mangled once through the machine. The speed may be regulated so that the goods remain 4 minutes in contact with the liquor.

The starting bath is charged with:

2—2½ lbs Immedial	or	2—2½ lbs Immedial	} per 10 gals. dye liquor.
Black FF extra		Black NB	
1 lb—1 lb 3 oz sodium sulphide		1 lb 3 oz—1 lb 8 oz sodium sulphide	
5 oz soda ash		5—8 oz soda ash	
1½—2 lbs common salt		1 lb 3 oz—1½ lb common salt	

For subsequent lots the old bath is kept up to strength during the passage of the pieces with:

10—12 ‰ Immedial	or	10—12 ‰ Immedial	} calculated on the weight of the goods.
Black FF extra		Black NB	
5—6 ‰ sodium sulphide		6—8 ‰ sodium sulphide	
½—1 ‰ soda ash		1 ‰ soda ash	
1—2 ‰ common salt		1—2 ‰ common salt	

As a rule the dyeing is carried on at a temperature of 175—195 ° F.; frequently, especially when the goods are easily penetrated, a lower temperature (about 125 ° F.) suffices.

The dye bath is heated by means of an iron coil. The use of copper pipes in the machine or of any copper fittings at all is absolutely inadmissible.

As soon as the pieces have left the dyeing machine they are taken for the final washing on to a full-width washing machine or a jigger fitted with sprays.

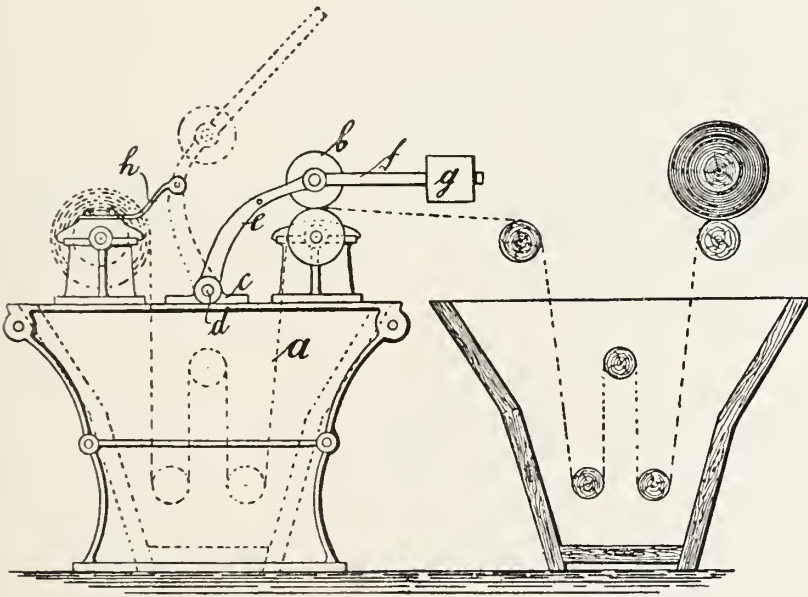
Special attention must be paid to a very thorough washing, otherwise the goods will tend to rub off.

If the dyed shade happens to be too heavy, or if the goods cannot be washed easily clean, a rectification of both may be achieved by an addition of some sodium sulphide (3—5 oz per 10 gallons) to the first washing liquor.

B. Dyeing in the Jigger.

For dyeing Immedial Black on piece goods, the jigger with squeezing rollers has been found eminently useful.

We give below a sketch showing the simplest and best way of fitting a squeezing roller to any jigger at hand.



The narrow end *a* of the jigger is fitted with two bearings *e* which carry a shaft *d*. To each end of the shaft, right and left, a lever *e* is immovably affixed by rabbet and wedge, which carry the squeezing roller *b*. The levers *e* extend beyond the roller bearing, so that they may be weighted with the weights *g*. When not in actual use, the whole arrangement is put into the position shown by the dotted lines and is there arrested by means of a bolt which passes through an eye affixed to arm *h*.

Jigger *a* is used for dyeing, the other jigger for rinsing only.

During the dyeing process the squeezing roller remains at rest above the jigger, and the dyeing is carried out as usual; at the last passage however the squeezing roller should be employed, and the goods pass through the nippers straight into the rinsing bath without being batched up.

Dyeing.

The dyeing is started with the following charge:

8	oz	soda ash	} per 10 gallons dye liquor.
3½—	5	lbs Immedial Black FF extra	
1	lb—1½	lbs sodium sulphide	
1	lb	3 oz dextrine	
1	lb—1½	lbs common salt	

Added to this are the following quantities calculated on the weight of the goods:

9—12% Immedial Black FF extra
4—5% sodium sulphide.

The goods are passed through the boiling liquor 6 to 8 times and through squeezing rollers straight into a second jigger containing cold water. After a thorough rinsing they may if required be aftertreated.

For further use, the old bath is replenished with:

½—1% soda ash
9—12% dyestuff
5—6% sodium sulphide
2% dextrine
1—2% common salt

calculated on the weight of goods.

The first rinsing water may always be re-added to the dye bath.

When dyeing very large batches it is well to increase the quantity of sulphide by one quarter and to make this extra addition just before the last end.

The washing is carried out same as described on pp. 72 and 73.

For Immedial Black NB and NG the dye baths are charged as follows:

Starting bath:

8 oz soda ash	}	per 10 gallons dye liquor.
3½—5 lbs Immedial Black NB or NG		
1½—2 lbs sodium sulphide		
1 lb 3 oz dextrine		
1—1½ lbs common salt		

Added to this are the following quantities calculated on the weight of the goods:

- 9—12% Immedial Black NB or NG
- 5—6% sodium sulphide.

For subsequent lots:

2% soda ash	}	calculated on the weight of the goods.
9—12% Immedial Black NB or NG		
6—8% sodium sulphide		
2% dextrine		
1—2% common salt		

For Immedial Black NB and NG the squeezing rollers may be dispensed with and the ordinary jigger be used for dyeing. We beg however to point out that the application of squeezing rollers may be recommended for all sulphide colours, and that they should always be employed, except in cases where absolutely impossible.

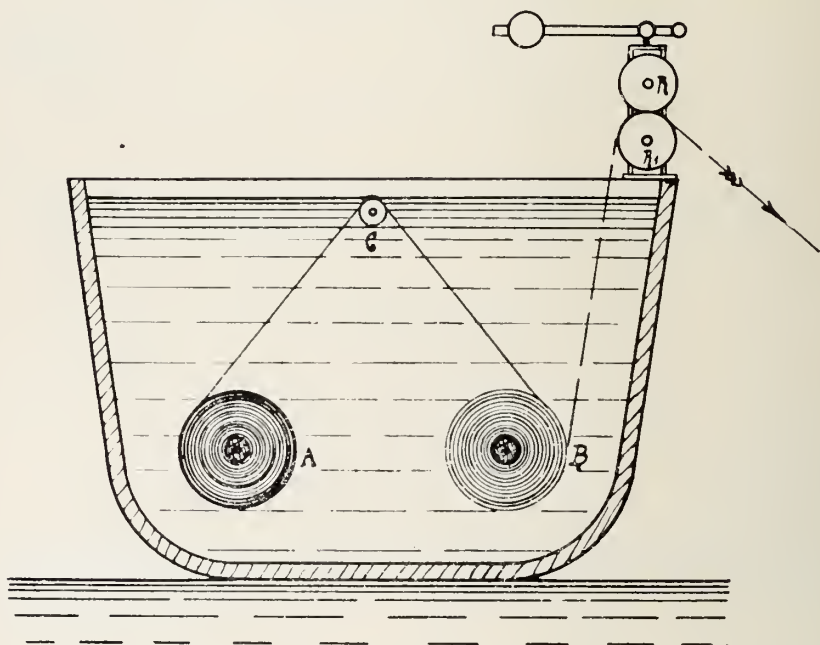
The dyeing process is the same as with the Diamine Colours, but care must be taken to have the goods washed as soon as possible after dyeing. Attention should also be paid to have the goods run as straight as possible during the dyeing process, so that the lists do not overlap.

For a third method we advise

C. Dyeing in the Jigger with Submersion.

which has proved most effective in a great many cases.

The method of working is evident from the subjoined sketch:



The dye vessel is made of either wood or iron. The two driven rollers *A* and *B* run in watertight bearings which are fixed into both sides of the jigger; the protruding shafts carry pulleys. Each roller *A* and *B* has first of all a wrapper of about 6—7 yards length, the end of which is sewn to the goods to be dyed. The pieces are first run as straight as possible on to roller *A*, and the other end sewn to the wrapper on roller *B*. The rest of the work is the same as in ordinary jigger dyeing, the goods changing their position from *A* to *B* and vice versa whilst running over the guide roller *C*. Four ends are sufficient for having the goods well penetrated and obtaining a rich black. On completing the dyeing, the pieces are passed through the tight fitting nippers *RR*¹ straight into an adjoining washing machine or jigger, to be thoroughly washed.

The dye bath is charged exactly as for dyeing in the ordinary jigger described on pp. 74 and 75, and the further additions for dyeing in the old bath are calculated in the same way.

Aftertreatment.

After dyeing the goods are treated with chromium salts. This aftertreatment has but a slight influence on the fastness, the direct dyeings being already exceedingly fast, it only effects an improvement of the shade. Bichromate of potash renders the shade more bluish, chrome alum deepens the black.

The quantities are

3⁰/₀ bichromate of potash

2⁰/₀ acetic acid, or,

if a more greenish shade is desired,

1¹/₂⁰/₀—1⁰/₀ chrome alum

1¹/₂⁰/₀—2⁰/₀ bichromate of potash

2⁰/₀ acetic acid.

The aftertreatment may be done at the boil either in the jigger or in the padding machine, one or two ends being sufficient in the majority of cases.

The treatment is followed by rinsing in cold water, the final rinsing being done in a solution of 3—5 oz. acetate of soda per 10 gallons water, out of which the goods are dried without being rinsed again.

If the goods are to be starched, the acetate of soda may be added to the finishing paste.

Dyeing Mercerised Piece Goods.

Mercerised piece goods are dyed similarly to ordinary pieces either in the continuous machine afore described, or in one of the various jiggers.

Immedial Black on mercerised goods yields a colour of a specially fine and rich shade which is very fast to rubbing; the lustre is not in any way impaired through dyeing with Immedial Black.

When dyeing in the jigger there is the additional advantage that the goods need not be soured off after mercerising, but may be dyed directly after rinsing without prejudice as to their alkalinity. (It should however be observed that the goods must not carry an excess of caustic soda, as this would render the bath too alkaline.)

A. Dyeing in the Continuous Machine.

The dyeing is the same as described on page 71, only the baths are kept weaker.

Starting Bath:

$1\frac{1}{2}$ — $1\frac{3}{4}$ lb Immedial Black or $1\frac{1}{2}$ — $1\frac{3}{4}$ lbs Immedial		$\left. \begin{array}{l} \text{FF extra} \\ \text{Black NB} \end{array} \right\} \text{per 10 gallons dye liquor.}$
$\frac{3}{4}$ —1 lb sodium sulphide	1 — $1\frac{1}{4}$ lb sodium sulphide	
5 oz soda ash	5 — 8 oz soda ash	
$1\frac{1}{4}$ — $1\frac{1}{2}$ lbs common salt	1 — $1\frac{1}{4}$ lb common salt	

For further use, the bath is freshened up with:

8—9 ⁰ / ₁₀ Immedial Black or 8—9 ⁰ / ₁₀ Immedial Black NB	
FF extra	
4—5 ⁰ / ₁₀ sodium sulphide	5—6 ⁰ / ₁₀ sodium sulphide
$\frac{1}{2}$ —1 ⁰ / ₁₀ soda ash	2 ⁰ / ₁₀ soda ash
1—2 ⁰ / ₁₀ common salt	1—2 ⁰ / ₁₀ common salt.

B. Dyeing in the Jigger.

Here also the method of working is exactly the same as described on page 73 for unmercerised goods, the necessary quantities being :

For the starting bath :

5 — 6 $\frac{1}{2}$ oz soda ash	6 $\frac{1}{2}$ —8 oz soda ash	} per 10 gallons liquor.
2 $\frac{1}{2}$ —3 lbs Immedial Black	2 $\frac{1}{2}$ —3 lbs Immedial	
FF extra	Black NB, NG	
1 — 1 $\frac{1}{4}$ lb sodium sulphide	1 $\frac{1}{4}$ —1 $\frac{1}{2}$ lb sodium sulphide	
1 — 1 $\frac{1}{4}$ lb dextrine	1 — 1 $\frac{1}{4}$ lb dextrine	
10 — 13 oz common salt	6 $\frac{1}{2}$ —10 oz common salt	

To this add further :

8—9 0/0 Immedial Black	or 8—9 0/0 Immedial Black	} calculated on the weight of the goods.
FF extra	NB or NG	
4—5 0/0 sodium sulphide	5—6 0/0 sodium sulphide.	
For subsequent lots:		
8—9 0/0 Immedial Black	or 8—9 0/0 Immedial Black	
FF extra	NB or NG	
4—5 0/0 sodium sulphide	5—6 0/0 sodium sulphide	
2 0/0 dextrine	2 0/0 dextrine	
1/2 0/0 soda ash	1 0/0 soda ash	
1 0/0 common salt	1 0/0 common salt.	

The rinsing is the same as described for non-mercerised goods on pp. 72, 73 and 74.

For Dyeing in the Jigger with submersion of the goods, the starting bath is charged with

1 $\frac{1}{2}$ —1 $\frac{3}{4}$ lbs Immedial Black	or 1 $\frac{1}{2}$ —1 $\frac{3}{4}$ lbs Immedial Black	} per 10 gals. liquor.
FF or V extra	NB or NG	
1 lb sodium sulphide	1 $\frac{1}{4}$ lbs sodium sulphide	
5 oz soda ash	5 oz soda ash	
1 lb common salt	1 lb common salt.	

To this add further:

8—9 0/0 Immedial Black	or 8—9 0/0 Immedial Black	} calculated on the weight of the goods.
FF extra or V extra	NB	
4—5 0/0 sodium sulphide	6—7 0/0 sodium sulphide	
For subsequent lots, the old bath should be replenished with :		
8—9 0/0 Immedial Black	or 8—9 0/0 Immedial Black	
FF extra or V extra	NB or NG	
4—5 0/0 sodium sulphide	5—6 0/0 sodium sulphide	
2 0/0 dextrine	2 0/0 dextrine	
1 1/2 0/0 soda ash	1 0/0 soda ash	
1 0/0 common salt	1 0/0 common salt.	

After dyeing, the goods are mangled and thoroughly rinsed. If this be done in a full-width washing machine, the first tank may be charged with a little sodium sulphide (about 5 oz per 10 gallons) in order to re-dissolve such colour as is only superficially attached to the pieces.

The a f t e r t r e a t m e n t is the same as described for unmercerised goods on pp. 76 and 77.

Very closely woven fabrics which are hard to penetrate may with advantage before dyeing be passed through a bath of Turkey red oil, 6 1/2 to 8 oz per 10 gallons, and taken from there straight into the dye bath.

Dyeing Immedial Blue C on Piece Goods.

For dyeing Immedial Blue the same machines are serviceable as for Immedial Black, but the washing or rinsing after dyeing must in all cases be omitted.

Dyeing in the Continuous Machine.

The dyeing can be completed in one run in the same machine as described for Immedial Black, page 71, except that there is no rinsing. The goods are squeezed off as well as possible and cuttled without washing.

The bath is prepared per 10 gallons with:

- 1—1½ lbs Immedial Blue C
- 8—10 oz sodium sulphide
- 5—8 „ caustic soda 75° Tw.
- ½—1 lb common salt.

To bring the old bath to its former strength the following additions are made, which represent the absorbed quantities:

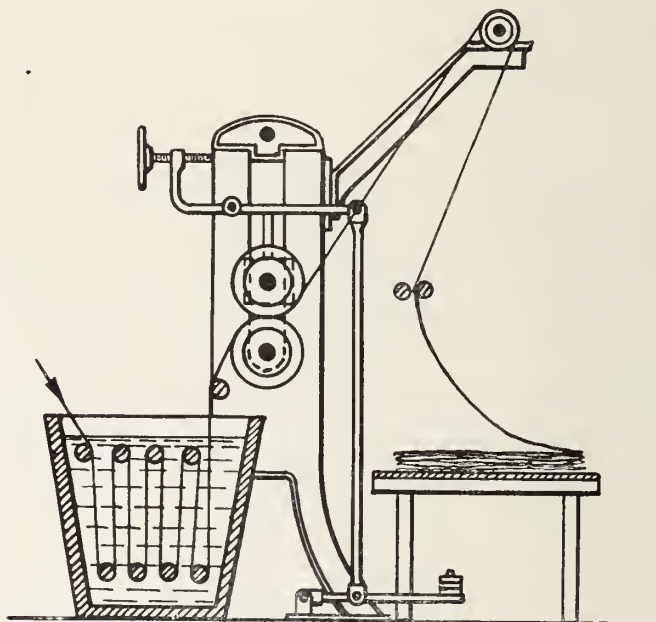
- | | |
|-----------------------------|---|
| 7—16 % Immedial Blue C | } calculated on the
weight of the dry goods. |
| 4—8 % sodium sulphide | |
| 1½—2 % caustic soda 75° Tw. | |
| 3 % common salt | |

Dyeing in the Padding Machine.

For this purpose an ordinary padding machine may be used, it does not matter of what construction as long as the nippers are not made of either copper or brass. Wooden, iron or rubber rollers are best suited.

The padding trough or roller box is made of either wood or iron, it should be fairly large and hold about 22 to 44 gallons of liquid. The rollers inside the box may be made of wood or iron, running in iron bearings. They should be fixed in such a manner as to give the goods 4—5 passages below the surface of the padding liquor.

The approximate arrangement is evident from the subjoined sketch.



The contact of the padding liquor with metallic copper or brass must be strictly avoided; wood, iron, lead, hard-lead or nickel have no deleterious influence. It is however to be observed that copper and brass are injurious to the dye liquor only, whilst dyed cotton may after rinsing be brought into contact with any kind of metal without fear of injury.

The trough is charged per 10 gallons, according to shade, with:

- 1—2 lbs Immedial Blue C, pat.
- 8—12 oz sodium sulphide
- 5—8 oz caustic soda 75° Tw.
- $\frac{1}{2}$ —1 lb common salt.

The bath is replenished by the addition of

6—15 % Immedial Blue C, pat.	} calculated on the weight of the dry goods.
4—8 % sodium sulphide	
1½—2 % caustic soda 75° Tw.	
3 % common salt	

The previously boiled off goods are dyed at about 195° F. in 2—4 passages, as required; it is well to cuttle the pieces after each end and not to batch them up.

Dyeing in the Jigger.

The dyeing of Immedial Blue C in the jigger offers the advantage over padding that the goods are dyed through more thoroughly.

As described before when speaking of Immedial Black, any jigger fitted with a squeezing roller may be used for this purpose. In its absence the working can be thus arranged that the goods are dyed in the ordinary jigger and taken from there straight on to a mangle or a padding machine in order to squeeze them well.

The starting bath is charged with:

10—18 % Immedial Blue C, pat.	} per 10 gallons liquor.
8—13 oz sodium sulphide	
3—6 „ caustic soda 75° Tw.	
½—1 lb common salt.	

After giving 6—8 ends at the boil, the goods are squeezed off without being washed.

The requisite quantities for bringing the bath up to its former strength are:

6—12 % Immedial Blue C, pat.
4—7 % sodium sulphide
1½—2 % caustic soda 75° Tw.
3 % common salt

calculated on the weight of the goods to be dyed.

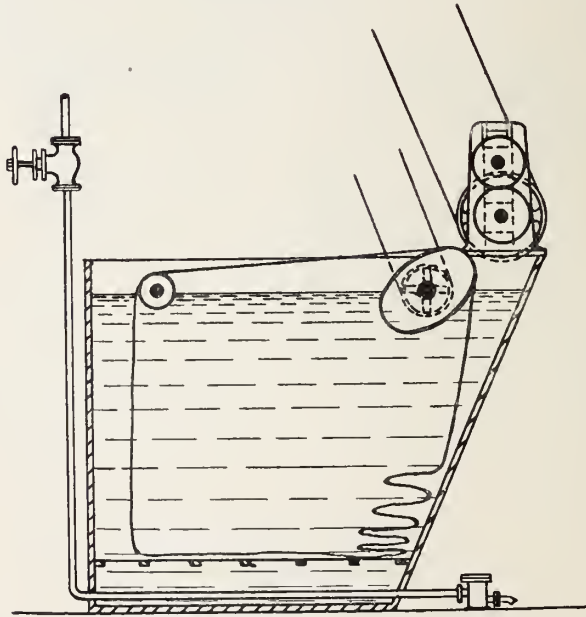
After squeezing, the goods are steamed but not washed.

Closely woven goods which cannot be penetrated easily, as also hard linen goods, require an addition to the dye bath of $\frac{1}{2}$ —1% Turkey red oil calculated on the weight of the goods and an extension of the time for dyeing up to $1\frac{1}{4}$ — $1\frac{1}{2}$ hour. The requisite quantities of colour for linen and linen and cotton mixed goods are much less than for cotton goods, the former requiring $\frac{1}{3}$ and the latter $\frac{1}{2}$ of the quantities indicated.

Dyeing over the Winch.

The open vessel or vat is used only in a few isolated cases, chiefly in dyeing linen and linen and cotton mixed goods.

The subjoined sketch illustrates the construction of this kind of machine, which is made of wood and is 5 feet to 5 feet 3 inches wide, corresponding with the width of the goods. The height is about 4 feet 6 inches, the depth front to back about 6 feet at the top and 4 feet at the bottom; the back may be sloping or partly rounded off.



The well boiled pieces, the ends of which are sewn together, are run into the machine at full width and the last free ends stitched together; the pieces run either over a guide roller or

over an expander which may be conveniently adjusted; they travel at a moderate speed by means of a belt-driven oval winch and are deposited in layers into the dye liquor. After dyeing, the goods are taken through two close-fitting, well wrapped squeezing rollers in order to be put into the steam box, either cuttled or hung up! The dye liquor should be heated by means of a steam coil.

The dye vat is charged per 10 gallons with

$\frac{1}{2}$ lb sodium sulphide

$6\frac{1}{2}$ oz caustic soda 75° Tw.

6—12 % Immedial Blue C, pat.

according to the depth of shade. An addition of common salt may be dispensed with.

The goods are worked at the boil for about 1—1½ hour until they are well dyed through; if this should not be easily attainable owing to the hard nature of the goods, an addition of about 1 oz Turkey red oil per 10 gallons will be found advantageous.

For succeeding lots the necessary quantities are:

3—4 % sodium sulphide

$1\frac{1}{2}$ % caustic soda 75° Tw.

4—8 % Immedial Blue C, pat.

} calculated on the
weight of the goods.

The goods are well squeezed and then steamed.

Developing to Blue.

The Blue may be developed either

- a) by steaming or
- b) by topping in the Indigo vat, regardless whether the goods have been dyed in either the padding machine, the jigger or the continuous dyeing machine.

a) Developing by Steaming.

The pieces are steamed after dyeing for $\frac{1}{2}$ hour without pressure, after having been well squeezed but not washed; any kind of steaming arrangement or wooden box fitted with a lid may be used for steaming, provided that both steam and air may be admitted simultaneously.

The adjusting of the air injector has been described on page 11.

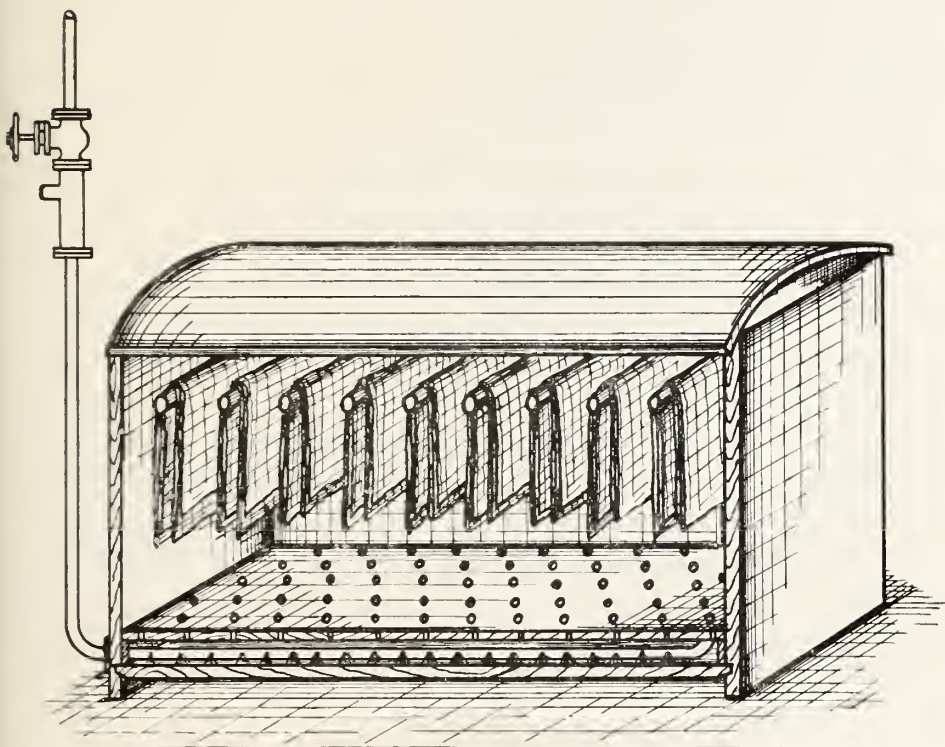
The steamers chiefly in use are:

the common steaming cottage as ordinarily used for steaming prints, in which the goods are suspended on moveable laths and steamed for $\frac{1}{2}$ hour without pressure but with admission of air.

a wooden steam box arranged as in the sketch below.

The steam box should be somewhat wider than the goods which are put over laths side by side. The height of the box must be calculated so as to leave a space of about 3—5 inches between the goods and the perforated bottom. The steam is admitted at the lower part of the box so that the condensed water may run off easily. The false bottom may also be covered with felting which prevents the goods being damaged by condensed water drops.

The cover of the steam box should best be shaped like a roof, be covered inside with felting nailed on to laths, and be slightly overlapping.



The steaming lasts about $\frac{1}{2}$ — $\frac{3}{4}$ hour, and great care should be taken that no water drops on to the goods during the process. The box may however be opened at any time if closed again, in order to watch the perfect development of the Blue, so long as the want of experience leaves any doubt about it.

If the steam be carrying too much water, a remedy may be found by providing a closed steam coil at the bottom of the box by which it may be heated some time previous to the steaming.

After steaming, the goods are lifted, rinsed in warm water and topped with basic colours as required (see page 15).

The matching of Immedial Blue dyeings is best done by passing a dyed and still undeveloped sample through dilute acetic acid or weak alum solution, and keeping it for reference without any further washing.

The treatment with either acetic acid or alum is necessary, as patterns thus treated will keep without altering, whilst without it they may easily become bluish.

As the effect of steaming is always the same upon the shade, dyeings should be matched before steaming.

b) Developing by Topping with Indigo.

It has already been pointed out when speaking of developing Immedial Blue on cotton hanks that this dyestuff possesses the valuable property of developing into a Blue not only by steaming but also by the alternate action of the reducing agents of the vat and the oxidation in the open air.

The process is carried out by first dyeing the pieces with Immedial Blue C in any of the machines described before. After being well squeezed, the pieces remain cuttled up for a few hours and are then topped in the Indigo vat. (See pp. 16 and 17.)

Dyeing Immedial Brown B and Immedial Bronze A on Piece Goods.

Immedial Brown B and Immedial Bronze A are dyed same as Immedial Black on piece goods.

Immedial Brown may be combined at will with Immedial Black.

Both colours are chiefly dyed direct, an aftertreatment with 1% sulphate of copper and 2% bichromate of potash being only resorted to if a particularly good fastness to light is required.

Appendix.

Dyeing Immedial Black on Hosiery.

Grey and Mode Shades.

Discharging Immedial Blue C.

Immedial Black for Grey Shades in Calico Printing.

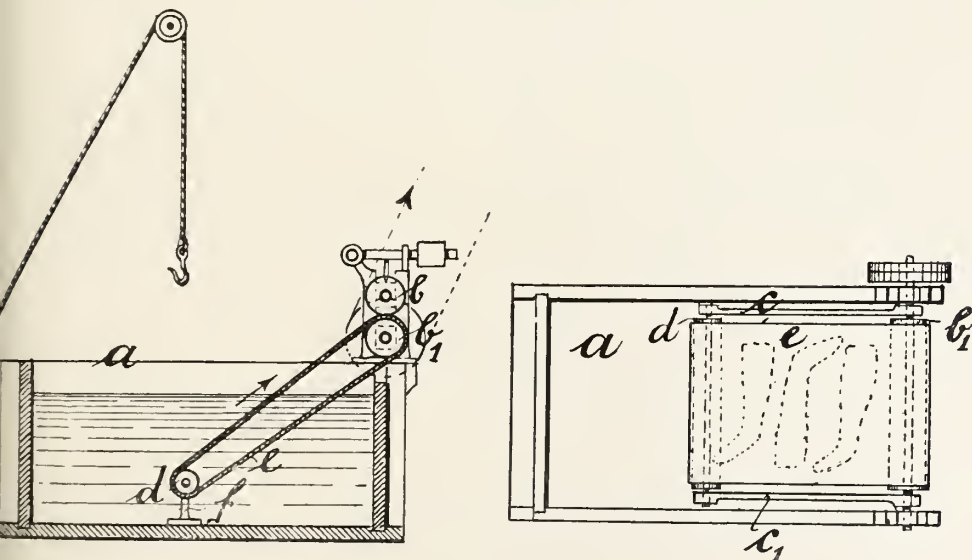
Immedial Black for Yarn Printing.

Dyeing of Linen and Cotton Mixed Goods and Linens.

Dyeing Immedial Black on Hosiery.

For dyeing hosiery with Immedial Black, the marks NB and NG have been found to answer best, the dyeing process being the same as for yarn. It has to be observed that the hosiery goods are well and evenly squeezed after dyeing and rinsed at once.

The squeezing may be effected with a similar arrangement as in yarn dyeing, or with a feeder as shown in the sketch below.



The dye vessel (*a*), which may be of any suitable shape, is provided with squeezing rollers (*b* and *b*₁). Two arms (*c* *c*₁) firmly fixed to each other as seen in the ground plan, carry the endless feeder apron (*e*) which travels also round the lower

squeezing roller (*b*₁). The lowest part of the apron is brought round a roller (*d*).

During the process of dyeing, the feeding apron is above the dye vessel; for use after dyeing, it is lowered into the vessel, where it rests by its own weight in two spring bearings (*f*) and is thus ready for use.

The required additions to the dye bath are the same as for yarn as indicated on page 30.

After dyeing and squeezing, the goods are taken at once into a rinsing vessel placed close by, where they must be well moved about and rinsed and if necessary aftertreated as described on page 33.

Grey and Mode Shades produced with Immedial Colours.

By dyeing pale shades, also by combination of the various Immedial Colours with one another, a large range of very fast shades may be obtained which have found an extensive use not only for loose cotton but also in hank and piece dyeing.

For dark shades, the process is the same as for dyeing Immedial Brown, whilst pale shades may be obtained similarly as with Diamine Colours, viz. without the use of squeezing rollers.

The dye bath may be charged with:

- 3% soda ash
- 3—4% sodium sulphide
- 3—4% Immedial Brown either by itself or combined with Immedial Black.

The goods are dyed for about $\frac{1}{2}$ hour in a warm bath, and rinsed.

The dyeings are eminently fast to washing, acids and light. Combinations containing Immedial Brown acquire increased fastness to light if aftertreated in a bath containing

- 1% bichromate of potash
- 1% sulphate of copper
- 2% acetic acid

for about $\frac{1}{4}$ hour at 155—175° F., after which the goods are rinsed.

As Diamine Fast Yellow B and Diamine Orange B may be dyed in the same way as Immedial Colours, they may be added to the Immedial Colour bath for shading purposes.

The dyeings may besides be also topped with either Basic or Diamine Colours.

Discharging Immedial Blue C.

Developed Immedial Blue dyeings may be discharged with chlorate discharge in the same way as Indigo dyeings.

The dyed goods are printed with steam white, then, in exactly the same way as with Indigo, passed once or twice through an open steamer and taken to a full-width washing machine, the first trough of which contains 1 lb caustic soda per 10 gallons and the second box pure water for washing. The caustic solution of the first box should be 140° F.

Steam White J.

Boil together:

6000	parts	gum thickening 1:1
3000	„	chlorate of soda; add lukewarm
2175	„	tartaric acid, when cold add
1275	„	yellow prussiate of soda dissolved in
2550	„	water
<hr/>		
15000	parts.	

Another discharge which is cheaper is made up as follows:

Steam White JC.

Boil together:

850	parts	China clay
850	„	water
4000	„	British gum thickening 1:1
2000	„	chlorate of soda; whilst still warm add
1450	„	tartaric acid, and when cold add
850	„	ferrocyanide of ammonia.
<hr/>		
10000	parts.	

Preparation of ferrocyanide of ammonia:

{	2500	parts	yellow prussiate of potash	{	dissolved.		
	4500	..	water				
{	1250	..	sulphate of ammonia	{	dissolved.		
	1750	..	water				
<hr/>							
10000 parts.							

Mixed whilst boiling.

Coloured discharge effects may be obtained by adding suitable Diamine Colours, such as Diamine Fast Yellow A and B, Diamine Orange D, Diamine Rose BD and GD, Diamine Catechine G and B to the steam white; Irisamine G may also be used in the same manner and yields a nice pink discharge effect.

Immedial Black for Grey Shades in Calico Printing.

Immedial Black printed on calico yields grey shades which are exceedingly fast to light and washing and which may be shaded at will with chrome colours.

The print pastes have the welcome property not to affect the engraved rollers or the doctors of the machine.

The print paste is prepared as follows:

Pale Grey.

Mix:

20	parts	Immedial Black V extra, G extra or FF extra
60	„	bisulphite of soda 72 ⁰ Tw., and allow to stand for 12 hours; dissolve in
200	„	water, add
570	„	British gum thickening (1 part gum, 1 part water) and finally
150	„	acetate of chrome 30 ⁰ Tw.
abt. 1000 parts.		

Medium Grey.

Mix:

40	parts	Immedial Black V extra, G extra or FF extra
120	„	bisulphite of soda 72 ⁰ Tw., and allow to stand for 12 hours; thicken with
540	„	British gum thickening 1:1 and finally add
300	„	acetate of chrome 30 ⁰ Tw.
abt. 1000 parts.		

The grey shades may be varied on the one hand by selecting one or the other of the various marks of Immedial Black and Immedial Blue, on the other hand by mixing these products with each other, or by shading them with the various chrome colours.

The following example is typical:

Printing in Combination with Chrome Colours.

Mix:

20	parts	Immedial Black V extra, G extra or FF extra
60	„	bisulphite of soda 72 ⁰ Tw., and allow to stand for 12 hours; add
50	„	water and thicken with
550	„	British gum thickening 1:1; add
20	„	Alizarine Blue CS, Anthracene Yellow GG or BN or Anthracene Acid Brown G dissolved in
150	„	water and
150	„	acetate of chrome 30 ⁰ Tw.

abt. 1000 parts.

After printing, steam as usual, wash and soap.

Immedial Black for Yarn Printing.

Immedial Black is very suitable for yarn printing, as it yields in the simplest manner a black of excellent fastness to washing, light and acids.

It must however be observed that neither copper nor brass rollers or blocks should be used; they must be made of wood, iron or lead.

Print Paste.

160	parts	Immedial Black FF extra or NB	are dissolved in
510	„	water	with addition of
60	„	sodium sulphide,	thickened with
250	„	dextrine,	to which are added
20	„	caustic soda	75° Tw.

abt. 1000 parts.

The printed yarns are steamed for 10 minutes.

After steaming, the yarns are put in small lots of about 2 lbs each into a chrome bath of 105° F. ($\frac{1}{2}$ lb bichromate of soda or potash per 10 gallons), in which they are left for a few minutes without being turned.

They are afterwards rinsed and well soaped.

As the chrome bath becomes strongly stained it has to be renewed for each small lot.

Dyeing of Linen and Cotton Mixed Goods and Linens.

Linen and cotton mixed goods and linens may be dyed exactly like cotton, if attention be paid to the fact that these goods require much less dyestuff than pure cotton; linen and cotton mixed goods demand about two thirds the quantity of colour for the same depth of shade and linens only one half.

The quantity of salt must also be reduced proportionately, only that of sodium sulphide remaining the same as for cotton dyeing.

Immedial Black pat. on Loose Cotton.

For dyeing loose cotton the various brands of Immedial Black find an extensive application in consequence of their eminent fastness towards milling and acids; they are dyed both in open pans as well as in dyeing machines.

The dyeings are most frequently produced direct, without the aftertreatment with salts of chromium, and only in a few instances aftertreated as described on page 23 in order to vary the shade.

Immedial Black has also been introduced successfully for the dyeing of cotton roving and sliver, giving an excellent fast black when dyed as described on pp. 45—48.

Immedial Blue C pat. on Loose Cotton.

Dyeings of eminent fastness to milling and light are obtained with Immedial Blue C which are sufficiently bright without any topping.

The dyeing of loose cotton and also the developing by steaming are operations of so simple a character that they may easily be carried out in any dye house. The exact process is described on pp. 49—52.

In the same way as for loose cotton, Immedial Blue may be applied for cotton sliver and roving.

The dyeing and developing of Immedial Blue on dyeing machines is described on page 50.

Immedial Black pat. on Loose Cotton.

1.



Immedial Black V extra
dyed direct.

2.



Immedial Black FF extra
dyed direct.

3.



Immedial Black NB
dyed direct.

4.



Immedial Black NG
dyed direct.

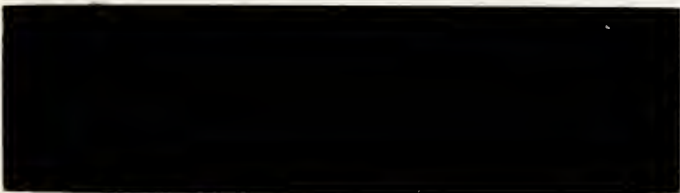
Immedial Blue C pat. on Loose Cotton.

5.



Immedial Blue C dyed direct, then steamed;
light shade.

6.



Immedial Blue C dyed direct, then steamed;
dark shade.

Immedial Brown B_{pat.} and Immedial Bronze H_{pat.} on Loose Cotton.

Dyed direct as well as when aftertreated with Nitrazol, Immedial Brown B yields dyeings of such excellent fastness to milling and acids as could not hitherto be produced with any other group of dyestuffs. Furthermore the property that Immedial Brown and Immedial Bronze may be very easily dyed in machines, promotes the application of the dyestuffs for loose cotton, sliver and slubbing.

The aftertreatment with Nitrazol is very simple and may be carried out in any dye vat as well as in dyeing machines.

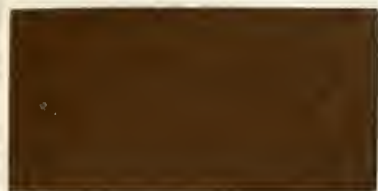
Immedial Bronze is principally suitable for producing fast mode shades, as it dyes very easily level and may be used to advantage in combination with Immedial Black.

Regarding the method of producing similar compound shades we refer to page 95.

II.

Immedial Brown B pat. on Loose Cotton.

1.



Immedial Brown B
dyed direct.

2.



Same as No. 1
and coupled with
Nitrazol C.

3.



Immedial Brown B
dyed direct.

4.



Same as No. 3
and coupled with
Nitrazol C.

Immedial Bronze A pat. and Mode Shades on Loose Cotton.

5.



Immedial Bronze A.

6.



Immedial Bronze A
Immedial Black NG
Diamine Fast Yellow B pat.

7.



Immedial Brown B
Immedial Black NG.

8.



Immedial Black NB
in light shade.

Immedial Black pat. on Cotton Yarn.

Cotton yarns are chiefly dyed with the following brands, viz.
Immedial Black V extra, FF extra, and
" " NB and NG.

The former yield the best black with a full, bluish shade, whereas NB and NG, particularly the first mentioned, yield a black coming very near them in this respect. In fastness to washing, light and acids, all four brands are of the same excellence.

They offer against Oxydation Black the advantage of a reliable and much simpler method of production, whereas over One-dip Aniline Black they possess the advantage of not rubbing off, a feature peculiar to One-dip Aniline Black dyeings.

The dyeing of **mercerised yarns** as well as the production of the scroop on these yarns is described on pp. 34—35.

The dyeing of hanks with Immedial Black in **machines** has proved of particular value for fine soft yarns, as in machine dyeing the hanks are better preserved than when working in the vats. Besides the FF extra brand our NB is chiefly used for these articles; in some instances also the two products are used in combination.

The dyeing of cops and cheeses with Immedial Black has been described on pp. 45—48. Also for these articles Immedial Black FF extra and NB are chiefly used.

Immedial Black pat. on Cotton Yarn.



Immedial Black V extra
aftertreated with
bichromate of potash



Immedial Black V extra
aftertreated with { bichromate of potash and
with { chrome alum.



Immedial Black FF extra
aftertreated with
bichromate of potash.



Immedial Black FF extra
aftertreated with { bichromate of potash and
with { chrome alum.



Immedial Black NB
dyed direct.



Immedial Black NB
aftertreated with
bichromate of potash.



Immedial Black NG
dyed direct.



Immedial Black NG
aftertreated with
bichromate of potash.

Immedial Black pat. on Mercerised Cotton.



Immedial Black FF extra
aftertreated with { bichromate of potash and
with { chrome alum.



Immedial Black V extra
aftertreated with bichromate of potash,
then scooped as indicated on page 34.

Immedial Black pat. dyed on Banks in Dyeing Machines.

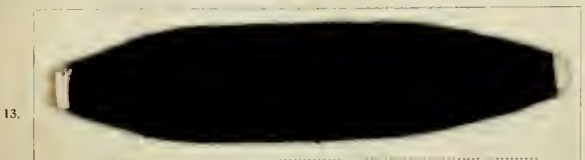


Immedial Black NB
aftertreated with
bichromate of potash.

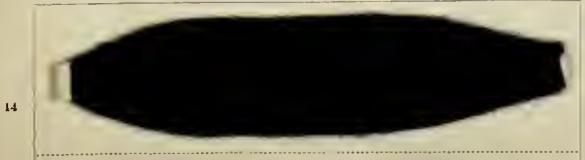


Immedial Black NB
Immedial Black FF extra
aftertreated with bichromate of potash.

Immedial Black pat. on Cops.



Immedial Black NB
dyed direct.



Immedial Black FF extra
dyed direct.

Immedial Blue C_{pal.} on Cotton Yarn.

For medium and dark blue shades Immedial Blue can compete direct with Indigo, against which it offers the great advantage of yielding dyeings of excellent fastness to washing and light, which do not rubb off, and costing only about half as much as pure Indigo dyeings.

The developing of the Blue by steam is such a simple operation that it may be carried out in any dye house where steam is at command; it may even be done in the dye vat proper. For further particulars we refer to page 39.

Immedial Blue finds an extensive application as a bottom for Indigo dyeings in such cases where the application of Indigo is desired. The yarn, after having been dyed with Immedial Blue, is given 1—2 weak ends direct in the Indigo vat, then an acid passage, and washed. The method of working has been described on page 16.

Immedial Blue dyeings are shaded off by being topped with basic colours, for which purpose New Methylen Blue, Indazine, Naphtindone are chiefly adapted. The fastness to washing and light is not affected thereby.

IV.

Immedial Blue C pat. on Cotton Yarn.

1.



5 % Immedial Blue C
steamed, then topped with
 $\frac{1}{4}$ 0/0 New Methylene Blue N.

2.



7 % Immedial Blue C
steamed, then topped with
 $\frac{1}{4}$ 0/0 New Methylene Blue N.

3.



9 % Immedial Blue C
steamed, then topped with
 $\frac{1}{4}$ 0/0 New Methylene Blue N.

4.



12 % Immedial Blue C
steamed, then topped with
 $\frac{1}{4}$ 0/0 New Methylene Blue N.

5.



13 % Immedial Blue C
steamed, then topped with
 $\frac{1}{2}$ 0/0 Naphtindone BB.

6.



15 % Immedial Blue C
steamed, then topped with
 $\frac{1}{2}$ 0/0 Naphtindone BB.

7.



Immedial Blue C

dyed on cops, steamed, then topped in a weak soap bath with a little
New Methylene Blue.

Immedial Brown B^{pat.} and Immedial Bronze A^{pat.} on Cotton Yarn.

The effects of the various methods of aftertreatment may be seen from the accompanying table.

Nos. 1 and 2 are the direct dyeings, Nos. 3 and 4 the same dyeings coupled with Nitrazol, whereby deeper shades with a yellower and fuller tone are obtained. Nos. 5 and 6 have been aftertreated with bichromate of potash and sulphate of copper resulting in a blackish, full shade of excellent fastness to light.

All the dyeings are excellent in point of fastness to washing, milling and acids and find manifold application as substitutes for Cutch dyeings, over which they offer the advantage of being superior especially in their resistance to acids.

As already stated on page 53, Immedial Brown as well as Immedial Bronze may be dyed very well in dyeing machines on sliver, cheeses and cops.

Immedial Bronze, on account of its excellent levelling property, is chiefly used for light shades or in combination with other Immedial Colours for the production of mode shades.

Immedial Brown B pat. on Cotton Yarn.

1.



5 % Immedial Brown B
dyed direct.

2.



8 % Immedial Brown B
dyed direct

3.



5 % Immedial Brown B
coupled with
Nitrazol C.

4.



8 % Immedial Brown B
coupled with
Nitrazol C.

5.



5 % Immedial Brown B
aftertreated with } sulphate of copper and
 } bichromate of potash.

6.



8 % Immedial Brown B
aftertreated with } sulphate of copper and
 } bichromate of potash.

Immedial Bronze A on Cotton Yarn.

7.



Immedial Bronze A
dyed direct.

8.



Immedial Bronze A
dyed direct.

Immedial Black pat., Immedial Blue C pat. and Immedial Brown B pat. on Woven Fabrics.

Immedial Black is already generally applied in the weaving industry, and many mills which hitherto dyed Oxydation-, Logwood-, One-dip-Black, etc. have supplanted these by Immedial Black which is now exclusively used for all articles.

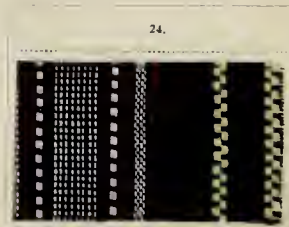
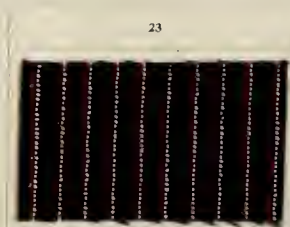
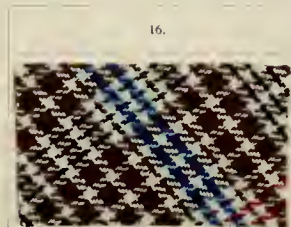
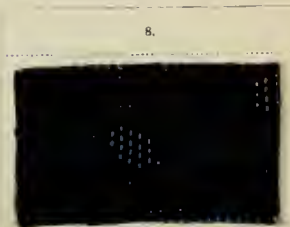
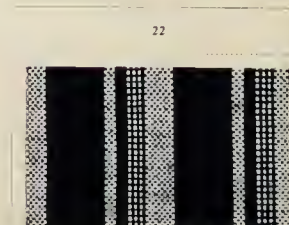
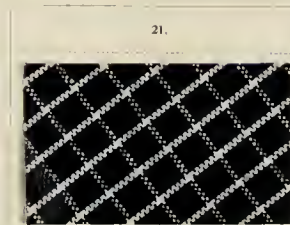
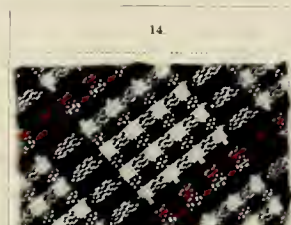
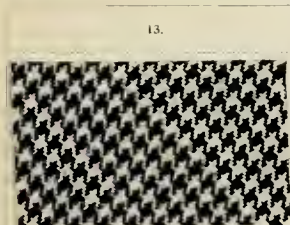
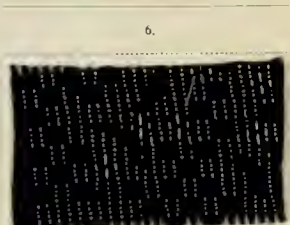
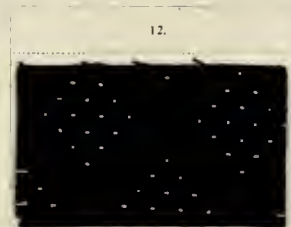
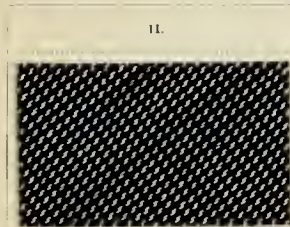
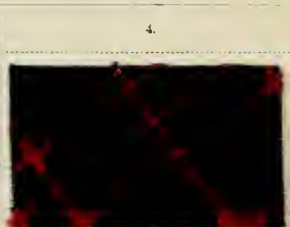
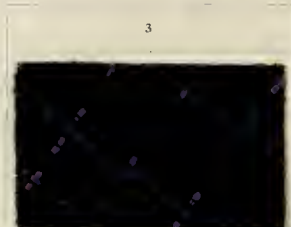
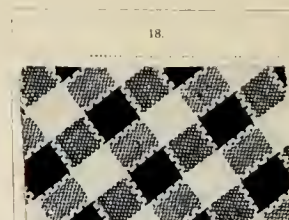
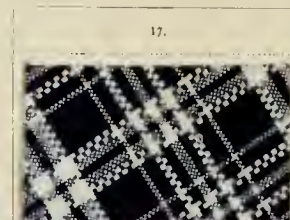
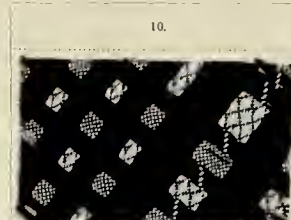
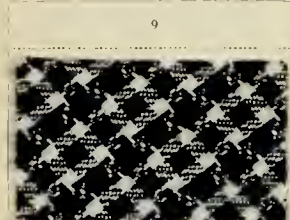
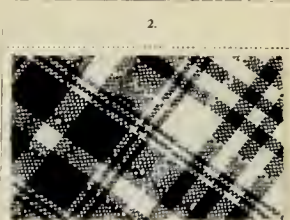
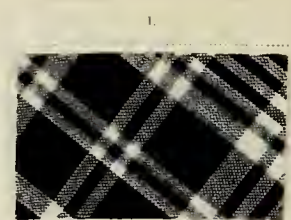
The dyeings are of excellent fastness not only to washing and light, but also to acids, and do not bleed on to cotton washed along with the same. Immedial Black is also used for yarns which are to be interwoven with white cotton, which latter is afterwards to be dyed in the piece with Diamine Colours.

Compared with Oxydation Black, Immedial Black offers the advantage of a much simpler and more reliable method of application, possessing also the same body of shade and being superior in fastness to wearing; over One-dip Aniline Black, Immedial Black offers the advantage of being fast to rubbing and not smutting on to interwoven white, whereas goods dyed with One-dip Aniline Black even after very frequent washings still smut strongly on to the skin and underwear.

Immedial Blue dyeings in a like manner are superior to Indigo dyeings in point of fastness to rubbing and are at least as fast to wearing; in this respect we refer to the remarks on page 105.

Regarding Immedial Brown we refer to page 106.

Immedial Black pat., Immedial Brown B pat. and Immedial Blue C pat. for weaving patterns.



The warp of patterns Nos. 6 to 8 has been dyed in machines, the prominent black on mercerised yarn in the hank.
All Immedial Blue dyeings have been slightly topped with basic colours.

Immedial Black pat. for Fast Black on Warps.

Immedial Black finds the most extensive application for dyeing a fast black on warps, which, contrary to the Aniline Black formerly employed, is completely fast to **rubbing** and **perspiration**; it withstands excellently the preparatory finishing operations (crabbing, steaming etc.), cross dyeing in an acid bath, as also the mordanting of the wool.

For details of the dyeing process and method of after-treatment we refer to pp. 57—64.

The accompanying patterns have been dyed in practice, partly with Immedial Black FF extra, partly with the NB brand.

No. 1 shows Immedial Black interwoven with wool after the preparatory finishing operation, the wool being **unbleached**.

No. 2 shows the well known silver grey, produced by topping the wool subsequently with Cyanole extra and Azo Orseille BB.

The wool of patterns Nos. 3 to 8 has been dyed subsequently, partly in an acid bath, partly on a chrome mordant as per the following details:

No. 3 in an acid bath with Brilliant Cochineal 4R.

No. 4 in an acid bath with $\left\{ \begin{array}{l} \text{Formyl Violet 10B and} \\ \text{Cyanole extra pat.} \end{array} \right.$

No. 5 $\left\{ \begin{array}{l} \text{in an acid bath with Naphtylamine Black T. pat.} \\ \text{No. 6} \end{array} \right.$

No. 7 $\left\{ \begin{array}{l} \text{with logwood after a previous mordanting.} \\ \text{No. 8} \end{array} \right.$

Union piece goods which are to be dyed subsequently in an acid bath are advantageously rinsed after dyeing in a solution of acetate of soda, 8 oz to every 10 gallons water, and dried without any further rinsing.

Instead of adding the acetate of soda to the rinsing bath, the pieces may also be padded with such a solution, for which purpose the trough is charged with 8 oz acetate of soda per 10 gallons water, and another 2% reckoned on the dry weight of the goods to be dyed are added gradually during the passage.

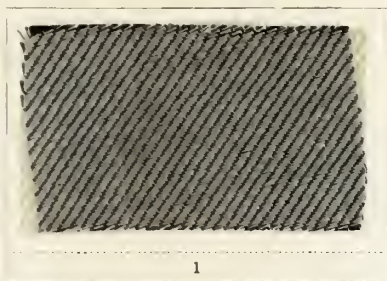
The rinsing as well as the padding with acetate of soda is always carried out in a cold bath.

The application of acetate of soda for Union goods which have previously been dyed in an acid bath has been protected to us by Letters Patent, and buyers of our Immedial Colours have the right to use this important process.

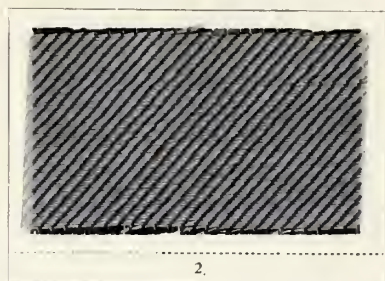
We further beg to add that this process has been found to answer very well and that it neither impairs the shade nor the properties of the wool.

VII.

Fast black warps dyed with Immedial Black pat.



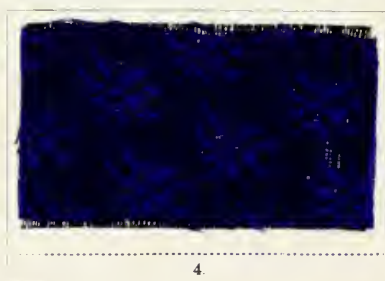
1



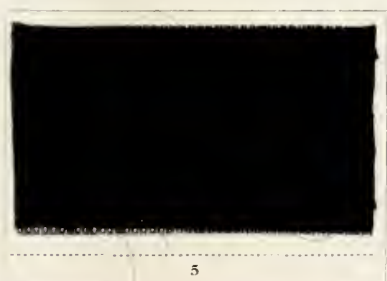
2



3.



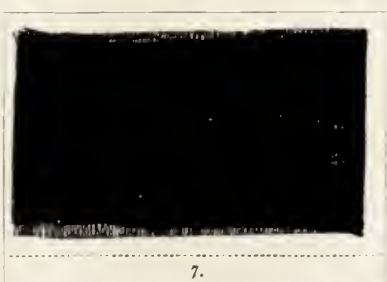
4.



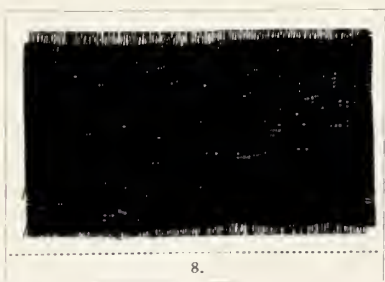
5



6.



7.



8.

Immedial Black pat. on Cotton Piece Goods.

On account of its considerable superiority in point of fastness even to the Aniline-Oxydation Black, Immedial Black has become established in the piece dyeing industry.

Particularly the brands FF extra and NB are most extensively employed for mercerised piece goods, for Jaquard goods, as well as for all kinds of dress goods and suitings, (such as moleskins, worsteds etc.), for which prominent fastness and body of shade are of consideration.

The dyeing is extremely simple and is done as stated before in the continue machine or in the double jigger provided with squeezing rollers. As soon as the squeezing roller, which may be easily adjusted, is in proper working order, any unlevelness of the dyeing is excluded.

The dyeings are mostly aftertreated with bichrome (for Blue Black), or with bichrome and chrome alum (for Jet Black); but if the direct shade already gives satisfaction, this after-treatment may be dispensed with. With the exception of No. 5 all the patterns have been aftertreated.

With regard to the addition of acetate of soda to the last rinsing bath we refer to page 77.

Immedial Black^{pat.} on Cotton Piece Goods.

1.



Immedial Black FF extra, on mercerised satin.

2.

Immedial Black NB and FF extra, in combination,
on mercerised serge.

3.



Immedial Black NB on Jaquard goods.

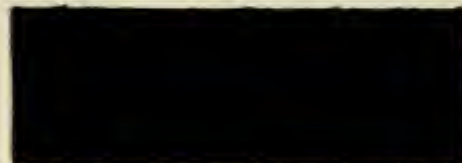
4.



Immedial Black NB on vestings.

Immedial Black^{pat.} on Cotton Piece Goods.

5.



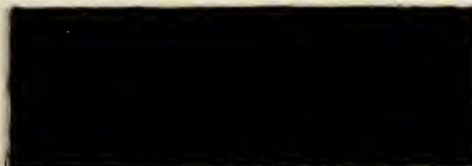
Immedial Black NB on gentlemen's suitings.

6.



Immedial Black NB on gentlemen's suitings.

7.



Immedial Black NB on moleskin.

8.



Immedial Black FF extra on moleskin.

Immedial Blue C_{pat.} on Linen and Cotton Mixed Goods, Cotton, and Linens.

Immedial Blue C has been very warmly and extensively taken up in the various lines of the **cotton, linen and cotton mixed goods**, and **linen industries**, and has chiefly established itself as a substitute for Indigo, the dyeings done with Immedial Blue possessing over Indigo dyeings the advantage of perfect fastness to rubbing, superior fastness to washing and wearing, and very considerably lower cost of dyeing.

Trials made with workmen's clothes with a view to ascertain the comparative fastness to wear have shown that Indigo dyeings turned considerably lighter after the first laundering already and became finally quite light and faint, so that the shade could hardly any longer be called "blue", whereas the suits dyed with our Immedial Blue after repeated washing still showed an intense blue.

The dyeings are mostly developed by means of steaming, which, as stated on page 87, may be carried out in an ordinary wooden box.

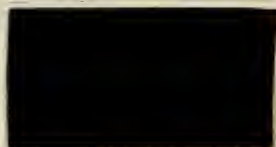
The application of Immedial Blue in combination with Indigo, as illustrated by pattern No. 7, also deserves special attention. Steaming is not resorted to in this case, as the blue is developed by topping in the Indigo vat. We refer to page 88.

Linen and cotton mixed goods and linens are best dyed in the jigger, as these materials are more easily dyed through in this machine than in the padding machine.

Immedial Blue C pat. on Cotton Piece Goods.

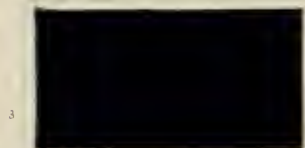


1



2

Immedial Blue C on satin
after steaming topped with New Methylene Blue GB. topped with New Methylene Blue N.

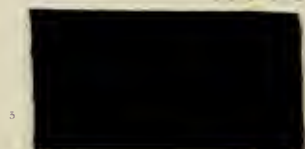


3



4

Immedial Blue C on apron cloth
after steaming topped with New Methylene Blue N. after steaming topped with New Methylene Blue N.



5

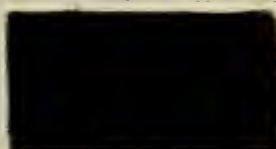


6

Immedial Blue C on suitings
steamed without topping. after steaming topped with Naphtindone BB.



7



8

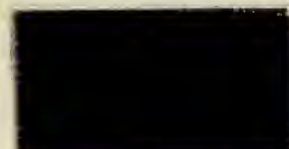
Immedial Blue C
for workmen's clothes,
topped with Indigo.

Immedial Blue C on moleskin
steamed, and topped with
New Methylene Blue N.

Immedial Blue C pat. on Cotton and Linen mixed Goods.



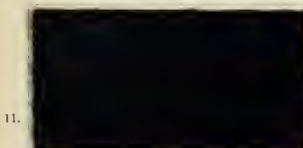
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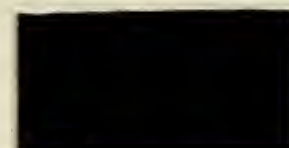
10

Immedial Blue C,
steamed and topped with
New Methylene Blue N.

Immedial Blue C,
steamed and topped with
New Methylene Blue GG.



11

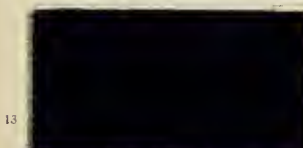


12

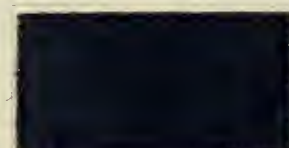
Immedial Blue C,
steamed and topped with
New Methylene Blue GG.

Immedial Blue C,
steamed and topped with
New Methylene Blue N.

Immedial Blue pat. on Pure Linen Goods.



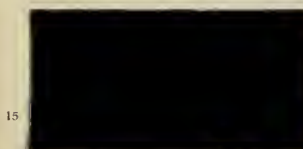
13



14

Immedial Blue C,
steamed and topped with
New Methylene Blue N.

Immedial Blue C,
steamed and topped with
New Methylene Blue GG.



15



16

Immedial Blue C,
steamed and topped with
New Methylene Blue GG.

Immedial Blue C,
steamed and topped with
New Methylene Blue GG.

Immedial Brown B, pat. and Immedial Black, pat. on Velvets.

In velvet dyeing Immedial Brown B is more extensively used as a bottom for brown, olive, and mode shades than for the production of direct dyeings. Immedial Brown B is for this purpose dyed in 2 or 3 different shades and the dyeing is hereafter brought to the desired shade by topping with Diamine Colours according to requirement.

In some special cases a basic topping is hereafter applied, or the goods are, after the topping with Diamine Colours, after-treated with sulphate of copper and bichromate of potash.

Immedial Black NB is the most suitable brand for the production of Black on velvet. The dyeing should be carried out in the jigger; after dyeing the goods should be well rinsed and aftertreated with 3 % bichromate of potash.

Dyeings which are subsequently painted with Prussian Blue must first be passed through a bath containing acetate of soda, which is best done in the padding machine, the vat of which is charged with $4\frac{1}{2}$ oz acetate of soda per 10 gallons water. During the passage another 2 % acetate of soda, reckoned on the weight of the goods, are added.

In view of its great importance for black dyeings, we have applied for a patent for the treatment with acetate of soda, and buyers of our Immedial Colours have the right to use this process.

Immedial Brown and Immedial Black on Velvets.

1.



Immedial Black V extra
shaded with:
Immedial Brown B.

2.



Immedial Brown B
topped with:
Diamine Catechine B
Diamine Orange B
then topped again with basic colours.

3.



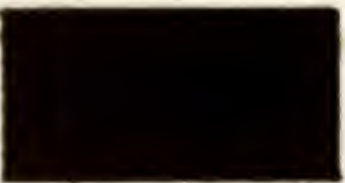
Immedial Brown B
topped with:
Diamine Catechine B
Diamine Fast Red F
then topped with basic colours.

4.



Immedial Black NB
then painted with Prussian Blue.

5.



Immedial Brown B
topped with:
Diamine Fast Yellow B
Diamine Orange B
Diamineral Blue R.

6.



Immedial Brown B
topped with:
Diamine Fast Yellow B
Diamine Catechine B
Diamineral Blue R.

7.



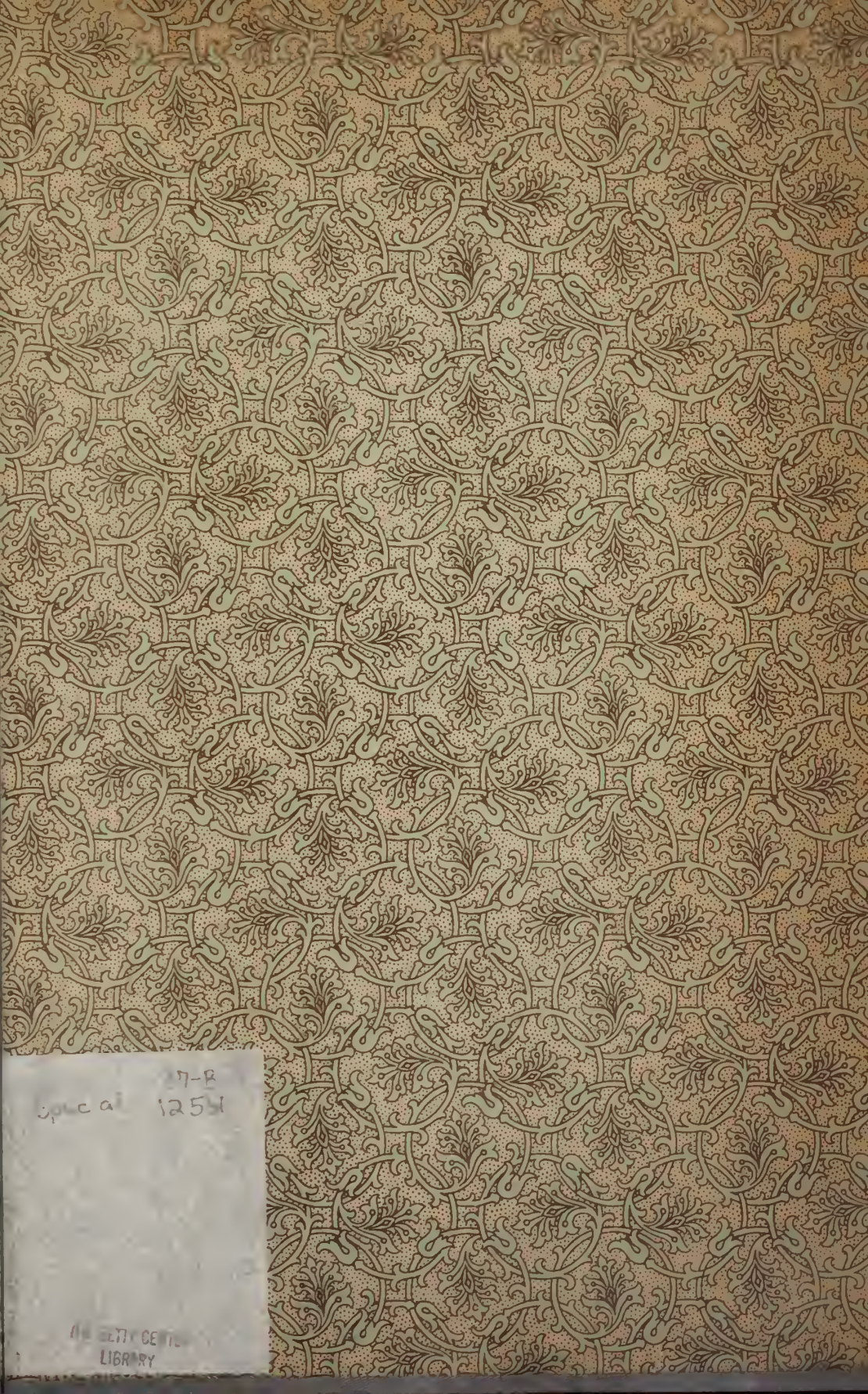
Immedial Brown B
topped with:
Diamine Fast Yellow B
Diamineral Blue R.

8.



Immedial Brown B
topped with:
Diamine Fast Yellow B
Diamine Orange B
Diamineral Blue R.





27-B
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